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SOIL CONSERVATION

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SOIL CONSERVATION

CLINTON P. ANDERSON
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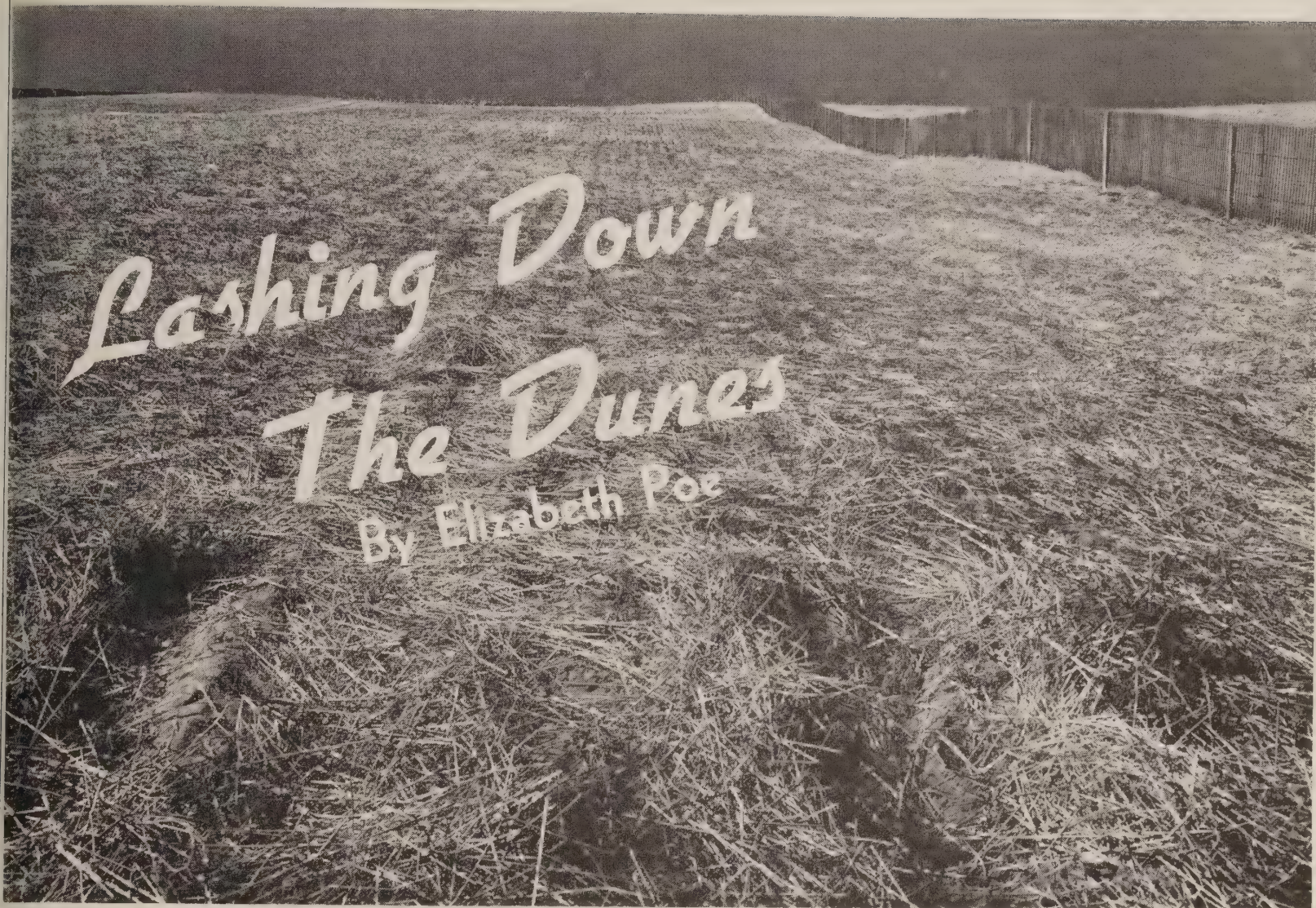
WELLINGTON BRINK EDITOR

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*Front Cover: Scene from one-reel motion picture, "Your Soil Conservation District." Bruce Linger, Skin Creek, Lewis County, W. Va., mowing as part of pasture improvement program.
Photographer: Hermann Postlethwaite.*

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Rye was planted on this leveled sand dune area before the straw was applied. The rye grew up through the straw. A snow and windbreak fence at the right aided the revegetation.

To stabilize a 20-mile stretch of railroad bed in southern Colorado 800 acres of shifting sand dunes were leveled, seeded to grass, and lashed down with straw. By thus winning the war against the wind the Soil Conservation Service saved taxpayers as much as \$2,000,000.

Conquering this troublesome blowsand area became a necessity in 1936. Congress had passed a flood control and water conservation act authorizing the construction of the John Martin Reservoir on the Arkansas River in Bent County, near Cad-doa, Colo. The main line of a railroad, between Lamar and Las Animas, Colorado, ran within the reservoir area laid out for the dam. It had to be moved. There were two routes that the new track could take. One was through the fertile, irrigated valley north of the Arkansas River—a route that would have ruined thousands of acres of food-producing land and have involved a large expense

for right-of-way, bridge and grade crossings. The route finally selected involved an area of sandy, dry, grazing land—a local patch of Sahara country that wasn't then of much use to anybody.

Railroad officials knew that the shifting sands of the area would be a permanent cost and constant menace to the safety of speeding trains. U. S. Army Engineers in charge of constructing the dam were confronted with this problem of safely relocating the tracks, and this had to be done at government expense.

The engineers sought a solution. Down in the Texas Panhandle and in other parts of the so-called "dust bowl" technicians of the Soil Conservation Service were making headway against similar sand dunes. The problem was taken to these soil scientists. They agreed that the job of tying down the dunes would be difficult, especially in view of the need for speed, but they were willing to make the attempt, and the railroad engineers felt that if the dunes could be stabilized, every-

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Strong winds were cutting away this main-line fill. Grass eliminated the hazard.



Clifton L. Etter, Soil Conservation Service technician, was in charge of stabilization job. Grass taller than his head now grows on once-barren sand area.

thing would be ready for relocation of the railroad.

Clifton L. Etter, experienced sand dune stabilizer with the Soil Conservation Service, was handed the assignment. He was given only two growing seasons to complete it.

Etter knew that the only way to reclaim the dunes was to hold them down. This meant trying to get a solid cover of something to hold the shifting sand—grass preferably. He began work June, 1939. The dunes were leveled with bulldozers, and sand-loving grasses known to be effective against wind were planted on a representative dune area of about 125 acres. This didn't work. The sweeping action of wind-driven sand destroyed the young plants before they got established,—under the handicap of only nine inches of rainfall.

It was then decided to cover the land with a mulch material—wheatstraw—to hold the sand in place. Again grass was planted. This time it was covered with straw. The straw was tucked into the sand with roller equipment. Soon grass began to shoot up through the straw.

After the dunes were leveled, the land was seeded with a double colter disc-type drill to a mixture of adapted grasses. This mixture—23 pounds to the acre—consisted for most part of sand drop seed (*Sporobolus Cryptandrus*), blue grama (*Bouteloua Gracilis*), side oats grama (*Bouteloua Curtipendula*), and blowout grass (*Redfieldia Flexuosa*). Next, local farmers who had contracted to bring the straw began hauling it to the site in trucks. The trucks had to be pulled through the dunes by tractors, and the straw was dumped in



One of the 22 dunes stabilized in southeastern Colorado.



Crawler-type tractor pulls three trucks loaded with wheat straw onto sandy area. Straw was rolled into sand, served to check blowing while grass took root.

windrows. A crew of men with pitchforks followed to do the spreading.

The straw was applied as uniformly as possible to a depth of approximately two inches, which required from five to seven tons per acre to get satisfactory coverage. Tucking the straw into the

loose sand was an important operation. If the straw hadn't been rolled immediately after application, the wind would have taken it up, leaving exposed sand which would require reworking to maintain uniform coverage.

Observation indicated that the effective life of



Santa Fe train speeds through what once was wasteland.

mulch in controlling soil blowing was about three growing seasons. According to Etter, this is an advantage in favor of mulch as a cover in this area, since the ultimate aim was to re-establish a permanent vegetative cover that would control wind erosion. When mulch is used instead of a growing crop for cover, soil moisture is not depleted, but is available for grass seedlings. Fair to excellent stands of grass were obtained on some of the mulched areas, Etter says, and the seedlings of some species became well enough established to produce a light crop of seed the first growing season.

The excavation for the new railroad bed through the active sand dunes started in October, 1939. This left borrow pits on either side of the fill that averaged about 75 feet in width. Altogether about seventy-five acres of freshly exposed sand presented yet another hazard. Seeding, straw spreading and rolling operations were started on these areas as soon as construction of the roadbed was completed. The steep sides of fills and cuts presented another problem. The roller slid and bunched the straw. By rolling the slopes at an angle they were handled satisfactorily.

Another area that required special treatment was about 700 acres of sage land on both sides of the right-of-way. This was seeded to grass in an attempt to increase the density of the natural

vegetation, which had been thinned by drought and overgrazing. In March, 1940, this land was seeded to a mixture of blue grama, side oats grama, Indian rice grass, sand drop seed, and Canada wildrye. A fair initial stand was obtained from this seeding, but with competition from old established plants and weeds, the stand decreased considerably before the end of the growing season. Removing the livestock from the land saved it, however, and the plants and weeds and grasses achieved a new vigor.

In other parts of the area trees and shrubs were planted as shelterbelts to break the speed of the wind. More than 29,000 cottonwood and tamarisk seedlings were planted on a mulched portion of a dune area in March, 1940. The trees and shrubs were taken from the river bottom, only a short distance away, and were planted in rows 11 feet apart running east and west, with the species alternated and spaced 4 feet apart in the row. About 77 per cent of the seedlings survived the first growing season.

The total unit cost per acre for stabilizing the dune areas, including leveling, mulching, and seeding native grass, was \$79, (the average cost of mulching alone per acre was \$46.64.) The cost of this entire job of stabilization was \$131,250. Pretty good public business, one might say.

SOUTH CAROLINA'S McARTHUR

Mention the name of McArthur among farmers of South Carolina and chances are they will ask, "Which one do you mean—E. C. or the general who's fighting the Japs?"

This is a story about E. C. McArthur. Gaffney, S. C., lays claim to him, but that doesn't mean you are likely to find him there. As president of the South Carolina Association of Soil Conservation District Supervisors, McArthur spends considerable time in various parts of the state, urging farmers to give soil erosion a knock-out blow—once and for all.

Soil conservation is Ed McArthur's religion. He knows the history of agriculture in this country from Washington's day, and he knows the interest Washington and Jefferson had in making a better agriculture for this country. **For years, he has carried on a battle against erosion in his own Cherokee County, and, too often, he has felt that he was alone in his fight to save the precious soil that was so fast being washed down to the sea. He worried over barren hillsides and steep slopes and the streams that ran red with the life blood of the land.**

In preparation for his duties as soil conservation district supervisor, Ed read the districts law. He also read the Secretary of Agriculture's statement and found what he believed to be the answer to the farmer's problem. To him, a soil conservation district, **OF farmers, BY farmers, FOR farmers,** seemed the most democratic way of operating, according to the belief that the masses of the people are capable of governing themselves.

To save the soil was an obsession with Ed McArthur. He accepted it as his mission. Furthermore, he realized the need for haste. He realized that our soil was fast washing away.

"There's not much sense shouting something about protecting our land when we let it wash right out from under our feet," McArthur declares. "Back in the old days we tried to lick erosion in a hit or miss fashion, but we don't have to guess any more, especially if we follow a complete soil conservation plan on our farms. Such a plan puts every acre to its best use and sets up the conservation methods that will control erosion and keep the land productive."



E. C. McArthur

If you observe McArthur at work on his own 165-acre farm in Cherokee, or carrying out his duties as supervisor of his own Broad River Soil Conservation District, or busy in his leadership of the state association of soil conservation district supervisors, you soon will recognize that he is carrying out his slogan, "Plan your work and work your plan."

McArthur never starts anything until he has a plan. Then he carries it out vigorously and effectively. Here's an example:

A survey made with the assistance of the Soil Conservation Service showed that the three counties of the Broad River Soil Conservation District had the staggering total of 98,000 acres of steep, eroded, idle land which was bringing in no return

to the farmers but was costing them as much per acre in taxes as their best cropland.

With this startling information before them, McArthur and the other supervisors called in representatives of various agricultural agencies in the district. Together they laid comprehensive plans to get this land back into profitable production through the planting of sericea lespedeza and kudzu.

By the end of the first planting season, nearly 4,000 acres of kudzu and sericea had been established on 600 farms in the three counties of the district. The program is continuing and in 1945 the supervisors ordered a half million kudzu crowns and made them available at cost to farmers, in addition to those which farmers obtained from other sources.

McArthur will back up any idea which he feels will advance soil conservation in his state. Last year a fellow district supervisor, J. B. Douthit, of the Upper Savannah District, suggested that the state association of district supervisors conduct an essay contest on soil conservation for school children. McArthur persuaded the South Carolina Bankers' Association to sponsor the contest in cooperation with the district supervisors' association. So well was the plan made and carried out that 4,832 essays were entered.

Another McArthur achievement is that South Carolina most likely leads all other states in the number of newspaper advertisements on soil conservation. He doesn't claim credit for all the advertisements that have appeared and are still appearing. But he did interest one banker in running a series of soil conservation advertisements, after which McArthur helped to sell the idea to supervisors of other districts in the state.

As a grass-roots soil conservationist and supervisor of the Broad River District since its organization six years ago, McArthur practices what he preaches. On his own farm he is carrying out a complete soil and water conservation program. For the first time, he says, he is not only controlling erosion but also has considerably increased the per-acre yields of all his crops. **Three years ago he won first prize of \$750 over 531 other contestants in the South Carolina cotton improvement contest sponsored by Clemson College Extension Service and commercial firms. He produced 5,700 pounds of lint cotton on a 5-acre demonstration plot. As a result of the increased feed produced through better land use and improved rotations, McArthur has added a herd of 32 registered Hereford cattle and is following a well-rounded farm program that**

puts every acre of his farm to the use for which it is best adapted.

But McArthur's interest in soil conservation is not limited to his own farm, community, district, or state bounds. At his own expense, because he received no salary either as district supervisor or as president of the state association of supervisors, McArthur has traveled through most of the South in the interest of soil conservation and has appeared on a national meeting of the Friends of the Land in Chicago. He preaches soil conservation with all the fervor of an old-time evangelist, picturing the hell-fire and damnation of erosion on one side and the promised land of soil conservation on the other, with no middle ground.

And he visualizes the soil conservation district movement as a manifestation of democracy at work on the land. Here's the way he expressed this philosophy in the last annual report of the Broad River Soil Conservation District:

"We want our people, down to the last pupil in a one-teacher school, to know that soil conservation districts and the districts law have a deep meaning and a deeper influence that can be readily understood by those of us who believe in a democracy which allows the people to run the government, instead of the government's running the people; for soil conservation districts are created by the people for the help they can be to people, and they are managed by the people themselves. Whatever the objective of any movement may be, the safety of a nation lies not in the hands of the few but in the hands of a people who believe in the democratic idea that the masses are capable of governing themselves, and who enter into the affairs of government and accept their responsibilities to participate as a God-given right. Such is the philosophy of the Soil Conservation District Law."

—Ellen S. Cobb.

WHY DISTRICTS SUCCEED

Eight primary reasons for the remarkable success of soil conservation districts were advanced recently by Dr. H. H. Bennett, chief of the Soil Conservation Service. These farmer organizations are making headway, he pointed out, largely because—

1. They are typically American, in that they provide a means for mutual action toward common objectives as determined by the majority.

(Continued on page 15)

By R. R. HUMPHREY

A spring Chinook wind literally blew a soil conservation program into George and Edna Davis' 1,750-acre ranch near Malott in Washington's oversized Okanogan County.

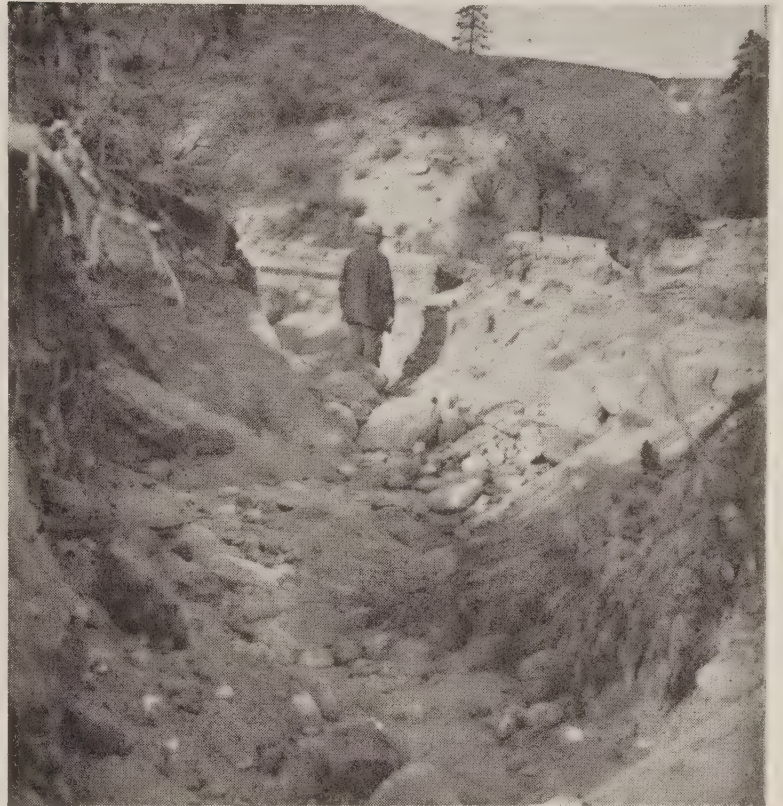
That was back in 1937. Runoff water from snow suddenly melted by the warm wind, and from rain, washed tons and tons of soil off the slope behind their house and deposited it on the more gently sloping lands below. It was not easy then for them to think of the calamity, as it surely was, as a good omen for the future, or to foresee such good things to come of it as profitable forage production on the offending benchland above and a 75 percent increase in the carrying capacity of the Davis range.

The Davises, though, always have looked upon land ownership and land use as a temporary stewardship over a heritage that is not theirs to

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To control runoff and erosion, contour furrows were constructed and the area was seeded to perennial grasses and sweetclover. These measures were highly effective.

It's an Ill Wind



This gully was caused largely by 1945 spring runoff below untreated benchland.



destroy. When their farm started to erode, it was natural, then, that they turn to Vernon Chapman, county agent, to see what, if anything, could be done. Chapman, who had been advocating soil conservation locally for several years, was glad to help out, and enlisted the aid of the Soil Conservation Service.

By the next spring, and with the help of a nearby CCC camp, a conservation plan was developed for the farm. The benchlands where the water originated were contour furrowed and seeded to a mixture of crested wheatgrass, bulbous bluegrass and sweetclover.

Grasshoppers took out the sweetclover at the end of the third year, but the grasses thrived and have furnished a large amount of feed every year since they became established. Runoff has been reduced to a minimum from the area, but has continued unabated from portions of the beach that never have been treated. Although a small amount of maintenance still is necessary to make these furrows fully effective, Davis says they never have needed any major repair or rebuilding—they were built.

Quoting Davis: "To me it proves, without a doubt, there should be thousands of acres contour furrowed in the county."

Certain it is that this combination of contour furrowing and seeding to perennial grasses not only has been highly effective in controlling erosion, but has provided a dependable supply of choice forage for livestock. Just how choice is indicated by Davis' account of the behavior of a bunch of purebred Herefords that grazed his range last spring. They first were turned out, he said on a field of rye that they pretty well cleaned up before looking around for more feed. About half a mile away, they located the crested wheatgrass-bulbous bluegrass seeding and next to it about a section of excellent native range. Not until the crested wheatgrass was largely gone did they begin to drift up to the native range.

During the hard rains of early February this year, when heavy runoff and flooding were rather general in central Washington, Davis said this flat with the contour furrows lost almost no water. His observation is borne out by the fact that erosion in the drainageway below was negligible, and the little washing that did occur came from water originating below the treated area.

Adjoining the contour-furrowed benchland lies a second bench of about the same size that has been neither furrowed nor seeded. Davis reported



George Davis examining one of the numerous "plugs" built across furrows. Note the good cover of perennial grasses.

runoff from this area is heavy almost every spring (as it was from the adjoining bench before treating). Again, the drainage below furnishes proof. A gully from one to two hundred yards long, 3 to 5 feet deep, and 5 to 10 feet across, washed out this spring (1945) and piled sand and rocks on the farmland and highway below.

By stocking conservatively and consistently deferring portions of his range until the grass seed matures, Davis has built up over the years some of the finest bunchgrass range in Okanogan County. This covers a lot of ground, when one considers that the county is the largest in the state, with an area of 5,221 square miles, or almost twice the size of the state of Delaware. The application of these practices, Davis says, has increased the carrying capacity of his range at least 75 percent.

This increase, though gratifying enough of itself, tells still another story. It indicates that even before he started his formal Soil Conservation program, Davis had been a conservationist; for his range today is producing two to three times the forage of the average range adjacent to his own.

In 1932 the Davises set out three acres of bottomland to peaches, that are irrigated by water from a spring. Although these three acres use all the water the present irrigation system will pick up, a recent estimate by Soil Conservation Service

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IOWA'S UNIQUE BRO-FALFA CLUB

By WALTER W. JOHN

Georgia has its kudzu and Kentucky its bluegrass, but Iowa has hitched up a grass-legume team that is winning honors in the Corn Belt. The team consists of alfalfa, long a favorite hay crop and soil builder, and brome grass, which has won a sound reputation in a short time.

Farmers in Shelby County, Iowa, think so much of this combination that they have organized to promote it. Bro-falfa Club is the name they selected. At their first annual banquet last February more than 200 farmers and other agricultural leaders came together to celebrate the club's founding.

Credit for developing initial interest in a brome-grass-alfalfa mixture is due Maurice Heath, manager of the Soil Conservation Service nursery in Ames; Walt Weiss, district conservationist at Harlan; and the Shelby County Soil Conservation District commissioners. The plan of soil conservation districts to distribute seed of newly developed brome grass strains has been an important factor in expanding the acreage of this soil-saving team in western Iowa.

"From an old yellow scene to a blanket of green" is the slogan. It was suggested by a member who has seen the reconversion worked on eroded cropland by this grass-legume mixture. One of the other "punch" lines that have been used to describe it is: "If you want your farm to last, rotate it with alfalfa-brome grass."

The stamp of royalty was placed on this pair with a mock wedding of King Brome and Princess Alfalfa at the Bro-falfa Club banquet. Toastmaster Nels G. Kraschel, former governor of Iowa, and now governor of the Farm Credit Administration at Omaha, classed it as "the most fruitful wedding we may ever see." Kraschel is a Shelby County farmer and one of the first-year directors of the club, all of whom were reelected for a second term.

Principal speaker was Feng Chao-lin, a Chinese graduate student at Iowa State College. He contrasted the benefits of grassland farming with the dangers of a *grassless* agriculture such as China's. Mr. Feng was one of the Chinese students who accompanied Dr. W. C. Lowdermilk on a 6,000-mile trip through China in 1943 to study erosion

problems and control methods. Telling his audience that the soil of western Iowa is quite similar to China's original wind-blown soil, he warned, "Let's start early and think about our land; China started late."

Shelby County farmers believe they have the answer to much of their soil conservation problem in brome grass and alfalfa. Farmers in several other counties have been using this combination and are contemplating the organization of other Bro-falfa Clubs. Shelby County conservation problems are quite typical of 20 other counties in the western-Iowa-Missouri loess area.

Main purpose of this first Bro-falfa Club is to acquaint farmers with the advantages of growing brome grass and alfalfa in combination, and with the importance of using only adapted strains of brome grass seed.

Achenback, Fischer, and Lincoln (southern types) are the only strains of brome grass that have the blessing of the club for Shelby County. Anyone trying to sell a club member any other strain is likely to have an argument on his hands. Members not only watch for the right strain but they also make sure that it carries the proper red or blue tag to indicate that it is certified.

Eligibility rules require that a member must own or operate farm land, must have used adapted brome grass seed or have a stand of an adapted strain, and must use brome grass in two or more ways such as rotation pasture, rotation hay, seed production, waterways, or buffer strips.

One goal of the club is to have brome grass-alfalfa seeded on nearly 150,000 acres of Shelby County land with 50,000 acres seeded annually. This acreage includes permanent pasture, permanent hay, and cropland in rotation in land capability classes II, III, IV, and VI.

Shelby County Bro-falfa Club members are confident that the brome grass-alfalfa team will bring them the following benefits:

1. More and better pasture and roughage.
2. Higher crop yields.
3. Maximum protection to sloping land.
4. More efficient livestock production.
 - a. By using livestock to harvest the crop.
 - b. By providing highly nutritious forage.
 - c. By reducing labor and machinery costs.
 - d. By improving livestock sanitation.
 - e. By reducing corn needed per animal unit.
5. Lower seed costs.
6. Better control of weeds.

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RAIN FELL.



Farms and highways were badly hit by the flood. Scenes like this may be seen almost every year in some parts of the San Joaquin Valley.

There have been harder rains and worse floods in the San Joaquin Valley than the storm of February first to third, 1945. It wasn't a "barranca storm" but it will serve as an example of the general problem. As a matter of fact, this semi-arid but fabulously productive southern half of California's famous Great Central Valley has so many floods and torrents of various sizes and degrees of destructiveness that its residents have come to accept them almost as necessary annoyances. And life being as satisfactory as it is in California, surely such annoyances can be borne without complaint.

Perhaps that is one reason that the cause and control of these floods have not been studied so thoroughly as in many other areas. It is known,

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however, (and the author wishes to make the point clear) that most of the floods are *not* caused primarily by the way the land is used and no conceivable changes in land use would, in themselves, entirely eliminate or control floods.

On the other hand, it has not been demonstrated that the principles (so often illustrated in *Soil Conservation* magazine) that govern the infiltration of rainfall into the ground, and the effects of soil structure, plant cover and land management practices on this infiltration, are different in the San Joaquin Valley than elsewhere throughout the world.

Undoubtedly the history of floods and torrents in the valley is as old as the mountains themselves. But a factor in the present problem is the early grazing history of the area. Wild herds of horses numbering many thousands were noted almost

in the San Joaquin Valley

By Floyd L. Otter



Main Street, February 2, 1945. Visalia's business property suffered a million dollars in damage.

daily by John C. Fremont in his trip up the Valley in 1844, and he was also struck by the "meagerness of the vegetation" and evidences that we now recognize as the signs of very heavy grazing. A. R. Mitchell in his book "King of Tulares" says "The Tulare (southern San Joaquin) Valley probably had more wild horses and mules than any other place of its size in the world." The Spanish authorities in the early 19th century ordered both horses and cattle slaughtered by the thousands to protect the ranges, but they could not control the

natural increase. In drouth years cattle died of starvation after grazing the land bare, as many as 30,000 dying on a single ranch. Heavy storms often fell on the bare ranges, causing some of the gullies and barren spots we see today.

The following paragraphs and accompanying photographs are presented to show what one of the frequent San Joaquin storms does to land and to property, and to mention some methods of handling the watershed lands that are in line with the principles that govern run-off and therefore



Some of the Valley's floods originate in the foothills where heavy grazing has been the rule for generations. These gullied ranges are in the Tehachapi area, Kern County. They offer unmistakable proof of the depletion that has taken place since Father Francesco Garces first crossed these hills in 1775.

would, if generally used, decrease the violence, the volume, the soil and debris load, and the destructiveness of these floods.

The immediate cause of San Joaquin floods of February 1945 was a general warm rain in the Sierra Nevada Mountains. The highest recorded rainfall for February 1 to 3 was 14.93 inches at Grant Grove in Sequoia National Park. Foothill areas received about 4 to 6 inches and Fresno, in the center of the valley, 1.3 inches.

The effects of the storm were felt in many parts of the valley but were noted particularly in and around Visalia, a city of about 9,000 people and the county seat of Tulare County.

Visalia is located near the center of a large and rich delta or alluvial fan formation built up by the outwash from the Kaweah River and several other streams. The County in 1944 produced agricultural products to the almost incredible value of \$148,998,405.

When the residents of Visalia went to bed the night of February 1 they knew that there had been

a good soaking rain, but they were hardly prepared for a splash into cold, muddy water on the bedroom floor when they jumped out of bed the next morning. Water reached four feet deep in some sections of the city and a motorboat made regular trips through the lobby of the city's principal hotel to carry guests from the elevator to busses and trains. Farmers along the various channels that traverse the delta area and along Kings River farther north, saw gullies and holes washed in their vineyards and orchards. The General Grant Highway at Centerville was washed out by Kings River.

As yet there are no soil conservation districts on any of the sloping lands of the San Joaquin Valley's eleven large counties. But there are some cases that show what soil conservation practices can do for land, and therefore point the way to a type of land management that would undoubtedly have a beneficial though unmeasured effect in reducing floods.

For example, there are farmers who are coop-

erating with the Soil Conservation Service and Extension Service in carrying out cooperative demonstration farm plans. On the day that the Visalia people were moving their wet furniture into the attic, two of these ranchers were out in the rain with their shovels. They were P. L. Vaughn and Byron Rector of Squaw Valley above Visalia, in Fresno County—ranchers who had built miles of terraces and diversion ditches on their farms. They knew what a rain like that could do to a field. Said Rector, who has 1,280 acres, 217 of which are grain-hay land nearly all terraced, "Before I started on these terraces my fields were all cut up by gullies so that I had to farm every one of my fields in several little pieces. Now there are no gullies, not even from this 6-inch rain, except where one ditch broke."

This was the first real test these terraces had had. Vaughn who operates a 482-acre ranch with 158 acres of cropland stated: "My ditches carried the water easily. If we ever get heavier rains than this one I think they'll still carry the water off without any trouble. I had to build up only one



Byron Rector slowed run-off and stopped most topsoil loss by building 15,000 feet of terraces and diversion ditches on his Squaw Valley ranch.

levee with the shovel and plug a few gopher holes. I don't believe I lost any soil at all from the terraced wheat field this year."

But building terraces and diversion ditches is not the only thing that these cooperative rangers in the foothills are doing to hold the rainwater into the soil and hold it for crop growth.

Acting upon the results of their own experiences and the advice of Extension Service and Soil Conservation Service technical men, they are getting away from the old grain-summer-fallow system of farming and are working towards crops that build up the water-holding capacity of the soil. Vetch sown with the grain shows much promise as a

builder of soil and a producer of more hay per acre, especially if fertilized with moderate amounts of low-cost phosphate fertilizer.

Vaughn and Rector are using specially made double disks that leave grain stubble on the surface to improve infiltration of moisture. On Sam Iriart's ranch in Kern County it was apparent after the February storms that his stubble mulched fields were almost free from erosion, whereas similar fields seeded on bare fallow land had not only lost many tons per acre of top soil but had shed so much water that terraces and gully dams were destroyed.

These men also recognize that good management builds up the water-absorbing ability of the hilly rangelands as well as enabling the range to produce more pounds of beef per acre. Their effort to conserve their cropland acres and build up their hay and grain production is largely with the idea in mind of making possible a conservative use of the range.

But does the work of these ranchers on their relatively insignificant acreage hold any promise as an alleviating factor in the flood problem? The answer is, undoubtedly, yes. We must recognize that when floods are controlled it will be as a result of a number of things: a few large undertakings; many, many small ones. Flood-control becomes useless if watersheds above them are not protected against the erosion debris that otherwise fills such reservoirs.

But every time a foothill rancher builds a stock-water dam to hold water or a terrace that makes the water "walk off" instead of "run off," or builds up the water-absorbing and water-holding ability of his cropland or range land by soil conservation practices, he holds back either water or water-borne soil and thereby makes the flood problem that much easier to solve.

He is entitled to a "thank you" from every townsman and farmer of the Valley's flood-threatened areas.

DISTRICTS *(Continued from page 8)*

2. They are independent. Their destinies are not controlled by outside influences, either State or Federal.

3. They exist for action. Their whole being is directed toward positive accomplishment.

4. Their work is founded on widespread local understanding. When farmers learn the facts about the land and agriculture in their district, they can agree on a united course of action and

(Continued on page 20)

NARROW SHELTERBELTS

for the

Southern

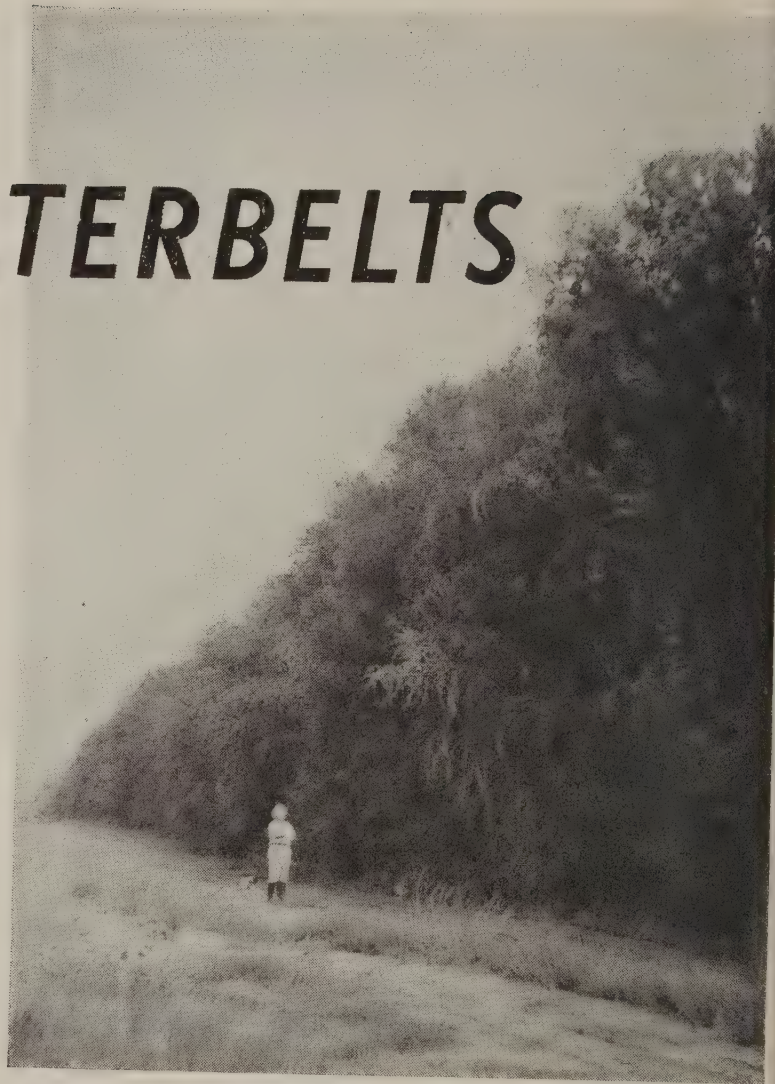
Great Plains

By JOSEPH H. STOECKELER

In the late summer of 1944, I had an opportunity to examine a number of shelterbelts in Oklahoma and Texas which were planted in the period 1935 to 1942, some by the Prairie States Forestry Project and several by the Lake States Forest Experiment Station. The latter were planted under my immediate supervision to determine the relative effectiveness of one-, two-, and three-row belts and to test several intensities of protection by varying the species and spacing between belts.

The plantings of particular interest were planted in the spring of 1935 in Beckham and Gr  r counties in southwestern Oklahoma, north of the city of Mangum. The average annual precipitation is about 26 inches per annum. The soil in the area is generally a Miles loamy fine sand or fine sandy loam, both subject to rather severe wind erosion unless properly managed. The crops are cotton and several types of grain sorghums such as kaffir and milo. The cotton yields are usually from $\frac{1}{4}$ to $\frac{1}{2}$ bale per acre while the field crops produce from 15 to 30 bushels per acre. Although these yields are not high, the land is sufficiently productive so that it cannot be considered submarginal.

EDITOR'S NOTE.—The author is silviculturist, Lake States Forest Experiment Station, University Farm, St. Paul, Minn. Credit is due to Herbert Wells, forester with the Soil Conservation Service in Oklahoma and to E. N. Munns of the branch of research, Forest Service, Washington, D. C., for aid in the collection of field data and helpful suggestions on the organization of this article.



A 2-row 9-year-old shelterbelt of Chinese elm and cottonwood on Cleburn Thomas farm near Willow, Okla. Heights of species: 42 feet and 48 feet, respectively.

The outstanding features of the shelterbelts, now 9 years old, were their remarkable growth rate and their effectiveness in stabilizing the soil and reducing wind erosion. Most of them are from 30 to 48 feet high and form a dense and effective wind barrier. According to the owners, the belts had shown considerable benefit in reducing wind erosion when the trees were 5 years old, at which time they were 20 to 25 feet high.

The accompanying diagram shows the plan of shelterbelts on the 160-acre farm owned by Mr. Cleburn Thomas. In September 1944 he said "In the last few years the protection offered by these shelterbelts has solved the wind erosion problem on this farm." In brief, the plan provided for blocking out the farm into eight 20-acre tracts, each completely surrounded by shelterbelts, usually of 2 rows, and involving 2 species of widely different growth rate and form. Cottonwood was one species appearing in every belt. It was chosen because of its fast growth and adaptability to the deep friable sandy soils. The other species selected to flank the cottonwood in each belt was of slower

growth rate and was chosen on the theory that it would help to fill in the gaps that would appear in the lower part of the cottonwood, and which are caused by its well-known habit of shedding its lower limbs from 8 to 15 years after planting.

Since the most damaging winds in this section are from the south or southwest, the spacing between east-west shelterbelts was one-eighth mile, or 660 feet. Experimental evidence shows that actual crop influences and reduction of wind velocity and evaporation occur in substantial degrees out to at least 10 times the height of the trees; hence, with expected ultimate heights of 60 to 80 feet for the cottonwood, good protection at all points was expected from this gridwork of shelterbelts, once the trees had attained most of their height growth. (Unpublished data by the Lake States Forest Experiment Station, shows increased cotton yields of 30 pounds per acre in the protected zone of shelterbelts in Oklahoma and Texas.)

The following table lists pertinent data on the 8 individual half-mile shelterbelts on the Cleburn Thomas farm.

It is seen that of the 8 belts, 6 were rated good or very good, one fair, and one was very poor. Cottonwood in most belts had a survival of 60 to 90 percent. Mulberry, Chinese elm, honey locust and green ash generally had satisfactory survival. In belts numbered 3, 4, and 8 the partial or com-

plete failure of one species was attributed to planting on a rather weedy ridge of sand built up in the fence rows on the property line and caused by wind erosion in past years. The sand ridges were 3 to 4 feet high and had rather poor moisture. Losses were accentuated by the severe drought in 1936—the year of planting. The results of the planting in belt 4 constitute some argument for use of more than one row; even though the cottonwood failed, the more drought-hardy honey locust survived and grew well, making a rather effective shelterbelt by itself.

It is in the data on average height and spread that we note rather remarkable growth rates. In all belts except one, cottonwood averaged from 30 to 46 feet in height. They had average diameters of 5 to 9 inches and crown spreads of 18 to 30 feet. Next to cottonwood in growth rate were Chinese elm and honey locust which average 42 and 32 feet respectively. Of the other species, mulberry and green ash were the most successful as low-growing flanks for the cottonwood. The black walnut was rated low in vigor because of poor adaptability to the soil and inability to compete successfully with the adjoining row of cottonwood. The maximum heights of individual trees in belt 6 were 55 and 47 feet respectively for cottonwood and Chinese elm. Desert willow grown next to cottonwood was very lopsided in shape due to suppression, and ap-

Belt No.	Direction 1	Success rating of belt 2	Row No.	Species	Estimated survival (percent)	Average height in (feet)	Average spread crown (feet)	Vigor rating 2
1	N-S	1	1	Desert willow 3	60	8	6	3
			2	Cottonwood	90	38	20	1
			3	Mulberry	70	15	13	1
2	N-S	1	1	Green ash	90	16	10	1
			2	Cottonwood	90	40	25	1
3	N-S	5	1	Catalpa	3	12	10	2
			2	Cottonwood	0	..	..	..
4	E-W	2	1	Cottonwood	4	18	12	3
			2	Honey locust	95	32	22	1
5	E-W	1	1	Cottonwood	85	36	30	1
			2	Black walnut	15	5	5	4
6	E-W	1	1	Chinese elm 4	90	42	22	1
			2	Cottonwood	90	48	24	1
7	E-W	1	1	Cottonwood	90	30	18	2
			2	Mulberry	95	20	16	1
8	E-W	3	1	Cottonwood	60	20	12	?
			2	Mulberry	10	8	6	2

1 N-S means North to South; E-W means East to West.

2 In the success and vigor rating scales: 1 = very good; 2 = good; 3 = fair; 4 = poor; 5 = very poor.

3 Desert willow was used as a replant for lilac which failed in 1936.

4 *Ulmus pumila*, usually called Chinese elm but sometimes known as Siberian elm.



Note density of lower half of crown in this 9-year-old shelterbelt of cottonwood and mulberry near Willow, Okla.

parently it is too intolerant of shade to warrant its use in such a combination of species. Honey locust also shows a similar tendency to being partially suppressed, especially if planted on the north or east side of the cottonwood where light is rather poor.

Among the best two-row combinations seen in Oklahoma and Texas were cottonwood and mulberry, and cottonwood and Chinese elm. The first is a particularly effective combination when the mulberry is placed on the south or west side of cottonwood since here it is suppressed least from lack of light. It forms an effective screen against winds that tend to sweep through the lower half of the shelterbelt.

Several other three-row combinations that were highly effective were mulberry, Chinese elm, and Russian olive in one belt, and mulberry, Chinese elm, and green ash in a second belt. A three-row belt of mulberry, cottonwood and osage orange were a good combination seen in one Texas shelterbelt.

In another planting made on the nearby J. C. Thomas farm and comprising 11 shelterbelts of one-, two-, and three-row width, only one out of 20 rows failed. The other 19 ranged from 60 to 90 percent in survival and had growth rates equal to or exceeding those on the Cleburn Thomas farm.

The most interesting belt on this farm was a single row in which cottonwood and mulberry were alternated tree by tree. It made a very effective combination because of interlacing of the limbs into a two-storied pattern and was quite a contrast with a single row consisting only of cottonwood. In the latter the thinning out and dropping of the lower limbs had already begun to impair its value as a field shelterbelt. Where cotton-



By contrast is the tendency to open up in lower half of crown in this 9-year-old shelterbelt of cottonwood only. As a wind barrier it is less effective.



These 7-year-old cottonwoods are 50 feet high. There is already a forest condition, with interlacing of crowns, leaf litter, absence of weeds or sod. Ruben Bittner farm, Willbarger County, Tex.

wood and mulberry were alternated in the same row, the mulberry tends to develop an asymmetrical form in its horizontal cross-section of crown with dimensions of about 8 by 18 feet. This is merely an adjustment of the crowns to the growing space available and does not impair the value of the mulberry as an effective windbreak. Another very effective belt was a single row of mulberry which was 20 feet high at age 9 and made a dense wind screen. Such plantings, made at intervals of 300 to 400 feet, can be made to yield a



Six-year-old shelterbelts protecting cotton field on J. H. McDougal farm, Willbarger County, Tex.



A young orchard of peach, cherry and plum, with a 3-row 5-year-old shelterbelt at left. The Chinese elm is 18 feet high and the two flanking rows of mulberry are 12 feet high. Ira L. Tucker farm near Paducah, Tex.

continuous crop of fence posts without impairing their value as shelterbelts by merely cutting out some of the larger stems. The cut stems promptly sprout up and make the tree even more bushy and leafy. Some farmers in this area use this very system of modified "coppicing" on their older mulberry hedges to obtain posts.

On a third experimental planting made on the J. W. Means farm near Willow, Okla., an effective combination of species consisted of one row of mulberry on the west or south side of two rows

of cottonwood. Heights at age 9 were 15 feet for the mulberry and 35 feet for the cottonwood.

Several shelterbelt enthusiasts were encountered who had specific comments to make on crop influences. One of these, Rube Bittner, who farms near Vernon, Tex., said that in 1944 he obtained a return of \$1,200 on 9 acres of watermelons grown in protection of shelterbelts. On a nearby farm a neighbor with similar soil but no shelterbelts required 20 acres to produce the same gross revenue.

Mr. Ira Tucker in Cottle County, Tex., has a



This 10-year-old shortleaf pine is 18 feet high. The belt is in Greer County, Okla.

rather elaborate set of shelterbelts mostly of 3 to 7 rows and has a young orchard of peaches and cherries. He said "Without shelterbelt protection, satisfactory fruit can not be produced in this section of Texas. I would sooner have 100 acres of farm with shelterbelts than 150 acres without."

Of course, the success of any shelterbelt planting depends upon the farmer. He has the vitally important job of cultivation of the trees for 4 to 6 years after planting or until such a period as the crowns begin to close or are near closure. This cultivation is by far his most important contribution to the success of the planting. It needs to be done annually 4 to 5 times the first 2 years after planting and 3 to 4 times per year for the following 2 to 4 years. The outside of the belt should preferably be kept reasonably free of weeds for the entire life of the belt even after there is stand closure. A few diskings or cultivations per year will suffice. Very often the cultivation or operation of equipment on turn rows is sufficient. Protection from livestock damage is a further essential detail that is the responsibility of the farmer.

In conclusion it can be said that, in those parts of western Oklahoma and northern Texas where rainfall is about 24 to 26 inches per annum, results of experimental planting and data on crop response tend to favor planting of rather narrow shelterbelts of one to four rows on the most favorable of the sandy sites where intertilled crops are grown and where wind erosion is a problem. An interval between the east-west belts of $\frac{1}{3}$ mile and of $\frac{1}{4}$ mile between north-south belts gives adequate protection to crop land if the tall-growing trees are of a type that will attain ultimate heights of 60 to 80 feet. Where they attain heights of only 20 to 30 feet, the interval between east-west belts should be cut to about $\frac{1}{16}$ mile.

The alternation in a single-row belt of two spe-



A right-angle view of the planting seen in the picture introducing this article.

cies of widely different growth habit and form, such as cottonwood and mulberry, proved to be quite successful, and introduces a new principle in shelterbelt planting that has not been used to any extent in prairie planting. It may have wider application with other combinations of species in other sections of the country.

IT'S AN ILL WIND *(Continued from page 10)*

technicians indicated that installation of a sprinkler system and other improvements will increase this irrigable area to seven acres. Some of this increase will result from more efficient use of water, some from a more effective diversion and delivery system, and some from a minimum of wastage as the water is applied to the land. Soil and water losses will be negligible.

The two rangeland practices prompted by that 1937 "chinook"—erosion control and forage production obtained through reseeding and contour furrowing on the one hand, and through range management on the other—plus erosion control on the orchard and the additional acreage that can be irrigated, combine to spell better farming for the George Davises.

DISTRICTS *(Continued from page 15)*

carry it out with every reasonable prospect of widespread satisfaction. Moreover, districts usually bring together as supervisors, by popular election, the leading farmers or landowners of the

(Continued on page 22)



THEY HELP MAP THE VICTORY

Scattered to the four corners of the earth are nearly 3,000 former employees of the Soil Conservation Service now in the armed forces of the United States. They fight on land, on sea, and in the air—some in front lines, others farther back. All are giving a good account of themselves.

Recently came to Washington a letter and picture from Sergeant Eloi Priemeaux, who served the Soil Conservation Service as an assistant soil conservationist in Lafayette, La. The picture, taken on the island of Oahu, Territory of Hawaii, shows soldiers of the 30th Engineer Topographic Battalion, which served a hitch in the European theater of operation (ETO) in 1943-44 before being transferred as a unit to the Pacific theater. Our readers will recognize many of these husky lads as outstanding technicians in the soil conservation program.

Front row: William S. Metcalf, agricultural aide, Beltsville, Md.; H. F. Mc-

Neill, engineering draftsman, Spartanburg, S. C.; James L. Gray, assistant soil scientist, Mansfield, La.; Raymond V. Leighty, assistant soil scientist; Conyers, Ga.; J. Y. Oakes, associate soil scientist, Tyler, Texas; James R. Moore, assistant soil scientist, Graceville, Fla.; Charles A. Williams, soil surveyor, Clarksville, Ark.; Arnold A. Knecht, Jr., soil scientist, Freeport, Ill.; Eloi Priemeaux, assistant soil conservationist, Opelousas, Ia.; Ralph J. Monty, Jr., soil scientist, Fairfield, Iowa.

Back row: John C. Cord, soil conservationist, Mott, N. D.; L. Cyril Higginson, assistant soil conservationist, Colorado Springs, Colo.; George Whiting, engineering aide, Beltsville, Md.; Joe Crown, topographic draftsman, Beltsville, Md.; S. Jack Friedman, Jr., cartographic engineer, Beltsville, Md.; Merton R. Chesley, Jr., civil engineer, Ellensburg, Washington; N. Talmage Nelson, assistant range conservationist, Yakima, Wash.

SOIL CONSERVATION SERVICE EMPLOYEES KILLED WHILE ON MILITARY FURLOUGH

Name	Date of Death
Bond, Alfred D.....	June 2, 1944
Brown, Noel A.....	February 5, 1942
Buoy, Chester L., Jr.....	December 22, 1942
Burgess, Robert E.....	February 20, 1944
Butler, Horace F.....	February 29, 1944
Carlson, Selway C.....	August 5, 1944
Coleman, Gerald D.....	June 25, 1944
Crow, Perry E.....	January 14, 1945
Deflinger, James Ralfe.....	June 7, 1944
Eberle, William, Jr.....	July 12, 1944
Elliott, James F.....	June 5, 1944
Engholm, John W. R.....	July 25, 1944
Espinosa, Delfin G.....	January 21, 1945
Ferril, Wilburn H.....	October 11, 1944
Forrest, Bedford H.....	November 26, 1944
Foster, Glenn E.....	April 11, 1944
Fraker, Richard A.....	November 1, 1944
Gandy, John E., Jr.....	December 9, 1943
Gleason, Paul J.....	November 22, 1944
Harrison, Ashley.....	July 14, 1943
Hawk, Ira A.....	July 23, 1944
Hirt, Peter, Jr.....	August 28, 1943
Hurd, Layton B.....	December 28, 1944
Irby, Francis M.....	January 27, 1945
Keathley, George D.....	September 14, 1944
Knuer, Otto E.....	July 19, 1942
Lane, Robert A.....	August 23, 1944
Leonhardt, Henry Lewis..	December 17, 1943
Lines, William.....	May 21, 1944
Loyd, William S.....	December 27, 1944
Lunt, George A.....	August 25, 1942

Name	Date of Death
Mickler, Marvin F.....	March 10, 1944
Mobley, James D.....	September 9, 1943
Moore, Alfred M.....	May 8, 1944
McCorkle, Capt. J. Ray.....	January 30, 1942
McKesson, Elmer L.....	July 12, 1944
Neely, Thomas W.....	June 7, 1944
Neumann, Wesley John.....	July 26, 1944
Nichols, Roy A.....	June 4, 1943
Noblitt, William G.....	February 10, 1944
Oppenheim, James R.....	July 1, 1944
Park, Robert S.....	September 19, 1941
Parkins, Judson Harlow.....	Spring 1944
Ripley, Raymond G.....	February 10, 1945
Rountree, James E.....	July 14, 1944
Saucier, Henry Quitman.....	April 28, 1944
Scott, Elbert D.....	August 8, 1944
Shelton, Frederick E.....	October 8, 1944
Shirley, Basil.....	June 17, 1944
Simons, John A., Lt.....	January 26, 1943
Smith, Franklin J.....	December 2, 1944
Smith, Gilmer P.....	May 31, 1944
Smith, Lionel F.....	June 6, 1944
Spofford, Gerald E.....	January 30, 1944
Stark, Nance D.....	March 9, 1943
Thompson, Loren E.....	July 24, 1943
Verner, Lemuel H.....	September 9, 1944
Walker, Neal H.....	October 27, 1944
Wayland, Clifford H.....	May 11, 1943
Wilmeth, Lillard G.....	February 11, 1945
Woolbright, Charles J.....	October 1, 1944
Wustrack, Robert R.....	March 19, 1944

DISTRICTS *(Continued from page 20)*

district, from different communities, with the result that some of the best thinking in each community is regularly interchanged with that of neighboring communities.

5. They are definite organizations that are able to plan programs, obtain information, procure governmental and other services, and do many other things that the same farmers as individuals, working alone, would not have been able to do.

6. They provide a recognized centering point and clearing house in the locality for carrying forward advanced agricultural programs and developments in general, from weed-control cam-

paign to group drainage project, as they are in the best interests of soil and water conservation and proper land use.

7. They provide a practical medium through which the encouragement, influence and assistance of local business and professional interests can be brought to bear in an effective, constructive way for the benefit of agriculture in the district.

8. They are in a position to provide helpful local guidance, responsive to the needs and desires of the local people, to such professional workers as the county agent, soil conservation technician, forester, and highway engineer.

REFERENCE LIST



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¹ From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

NATIONAL FARM-SAFETY WEEK 1945

BY THE PRESIDENT OF THE UNITED STATES
OF AMERICA

A PROCLAMATION

WHEREAS the Nation recognizes that the skill and labor of its farmers is a vital factor in winning the war, and the production of food one of the most essential means of winning the peace; and

WHEREAS the inevitable decrease in available farm labor this year creates an especially urgent need for conserving farm manpower to meet production goals in 1945; and

WHEREAS the accidents which cause some fourteen hundred farm residents to lose their lives each month, and one hundred and twenty-five thousand others to suffer injuries, constitute an unnecessary waste of human life as well as of time and material:

NOW, THEREFORE, I, HARRY S. TRUMAN, President of the United States of America, do hereby call upon the Nation to observe the week commencing July 22, 1945, as National Farm-Safety Week. And I request all persons and organizations concerned with agriculture and farm life to do everything in their power to educate farm people in the proper precautions by which they may eliminate farm hazards, and to stimulate a nationwide determination to stop the needless waste of irreplaceable farm manpower and property. And I further urge that farm people everywhere observe National Farm-Safety Week by making a safety check in their homes and on their farms.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States of America to be affixed.

DONE at the City of Washington this ninth day of May, in the year of our Lord nineteen hundred and forty-five, and of the Independence of the United States of America the one hundred and sixty-ninth.

By the President:

HARRY S. TRUMAN
(Signed)

Joseph C. Grew
Acting Secretary of State



Hugh H. Bennett
reports on **SOUTH AFRICA**

AUGUST 1945

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION

CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK EDITOR

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Afrikaner ox drinking water, Rust-der-Winter, South Africa.

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BETTER DIET THROUGH SOIL CONSERVATION

By Howard R. Tolley

Investigations of the American diet have revealed some unpleasant facts. In spite of what we frequently boast of as "the highest standard of living in the world," a large percentage of our people have never known the satisfactions they might have enjoyed through an adequate diet. Many have never had enough food; many more have never known what it means to have the proper food. In 1936, for example, less than one-fifth of the families of the nation had diets which measured up to all the allowances recommended by the National Research Council for good nutrition. As might have been expected, the greatest percentage of families attempting to live on poor diets were among the low-income groups.

Even in times of full employment and high national income, the American diet has not been ideal. A second survey, made in 1942, showed some improvement over 1936—and it is even possible that conditions have improved a little since then, in spite of rationing and wartime shortages—but neither survey indicates any reasons for complacency, though demonstrating that adequate income alone does not automatically insure a

proper diet. It was found, for example, even in the highest income groups in urban communities that one family in ten was subsisting on a poor diet,



Howard R. Tolley

NOTE.—The author is Chief, Bureau of Agricultural Economics, Washington, D. C.

and only one-half had diets which could be rated better than fair.

However, if a high level of national income alone will not entirely settle the problem of seeing that every American has an adequate diet, it does go a long way toward getting it settled, whereas a low national income goes a very long way toward increasing the problem. One of the first effects of a falling income upon national spending is to reduce the per capita consumption of such important high protein, mineral, and vitamin content foods as meats, poultry, dairy products, and eggs. For these foods are substituted cheaper and bulkier products which, though more exhausting to the soil in their production, do not adequately replace the animal products in human nutrition. It has been estimated that per capita consumption of meats and poultry might vary about 35 pounds (retail weight), and of milk about 100 pounds, under conditions of full employment and depression.

This is not the whole story, unfortunately. Not only do the farmers of the nation sell fewer

pounds of livestock products during depressions—what they do sell has to be disposed of at considerably reduced prices per pound. Consequently, the farmers are hit harder by depression than are non-farm people. This is demonstrated by the fact that while, in 1929, the total income of persons on farms was equal to about 11 percent of that of persons not on farms, the disparity broadened until, by 1932, it was equal to less than 8 percent. Because people employed in industry and trade had less money to spend, they not only spent a smaller amount on farm products, they actually spent a smaller proportion of a reduced amount on the products the farmers brought to market.

Because his income has been thus reduced, the farmer also has had to cut expenses somewhere. Unfortunately, following the line of the least resistance often has brought him to retrenchment at the expense of his capital investment. In one way or another the bill is passed back to the soil. Either the soil is neglected or soil nutrients are insufficiently returned through enforced economiz-



"Conserving soil resources while at the same time achieving a high level of nutrition."



"We shall have to adjust the stocking of these ranges to the number of animals they can safely carry."

ing on fertilizers. Thus the vicious circle is closed, the circle which began with increased depletion of human resources and continued to the ultimate depletion of natural resources. *The experience of depression years should help us to understand that this matter of conservation is not something which goes on in a vacuum, but something which is woven into the fabric of national poverty or prosperity. It points up the moral that to conserve one resource often helps to conserve other resources. It is no new thought, though it is one too easily forgotten, that man and the soil are so intimately related that, speaking broadly, whatever contributes to the good or ill of either has a corresponding influence upon the other.*

If the nation's nutritional needs, as distinguished from market demands, are to be met with anything like a reasonable degree of adequacy, there must be a considerable increase in the production of livestock and dairy products. One of the lessons we have learned from 1936 and 1942 surveys of family food consumption is that 1935-

39 per capita levels of consumption will not satisfy the demands of a proper national diet. During the wartime period, with high wages and full employment, thousands of persons have become accustomed to a diet richer in meats and dairy foods than they have been able to afford in the past. They will not willingly return to a diet greatly deficient in these items. Of course, with the end of the Japanese war and the demobilization of a large part of our military establishment, a much larger share of our livestock and dairy production will be available to civilians than at present. However, if income continues high, production must be kept well above 1935-39 levels to meet demand. Milk production may go to even higher levels if nutritional needs are to be met.

Last year, civilian per capita consumption of all meats went to nearly 150 pounds. Consumption would have been even higher had supplies been available. Consumption of poultry and dairy products also was high, yet consumers likewise would have purchased more of these products had they



"Thousands of persons have become accustomed to a diet richer in dairy foods."

been available. Recent studies made by Bureau of Agricultural Economics show that if the present levels of employment and income can be maintained, the consumption of meats, chickens, turkeys, and dairy products will probably rise, while that of eggs will be but slightly reduced. What is likely to be the effect upon our agricultural system under such conditions?

If anything like this potential consumption is realized, substantial shifts in our cropping systems and changes in some of our farming practices will be definitely called for in the years ahead. Much of the steep and eroded land now in cultivation will need to be retired from soil-depleting uses and seeded to grass. Much relatively level land in many parts of the country will also be affected. Acreages of soil-depleting crops must be reduced and the acreage of soil-conserving crops must be expanded.

In the national interest we should bring a halt to wastage of our soil. And when economically feasible that which is already greatly depleted should be relieved from soil-destructive systems

of utilization and turned to purposes which will enable it to produce its fair quota of products necessary to raising the national level of nutrition. This means—if we are to make the best use of the increased acreages of hay and pasture—that we shall have to adjust the stocking of these ranges to the number of animals they can safely carry without impairment of soil and roughage values. Many of these "new" range lands and hay and pasture lands can best be used to relieve the burden of too many animals on adjacent areas now overstocked. By this means production of livestock *products* can be increased by giving the animals *now on the range* an opportunity to produce more and better calves, make better steer gains, etc. Beginning at this end of the problem, we close the circle—here again is demonstrated that the conservation of a natural resource can contribute to the conservation of human resources.

It is estimated that by 1950—assuming full employment and a national income of something like 150 billion dollars—we could use an additional 3 percent of beef and veal, and about 9 percent more

milk than we produced in 1943. Because of heavy non-civilian requirements for pork and eggs in 1943, we probably shall not have quite so high a rate of production of these items in 1950, and possibly a little less mutton and lamb. But the demand for all these products can be expected to exceed that of the prewar (1935-39) years considerably. Still assuming full employment and high income for 1950, the estimates exceed 1935-39 levels as follows: Pork, exclusive of lard, would increase by nearly 65 percent, eggs by 30 percent, lamb and mutton by 16 percent, beef and veal by 25 percent, and milk by 24 percent.

If we go a step further and assume strong national programs for conserving our soil resources while at the same time achieving a high level of nutrition for all our people, even higher levels of consumption are possible. Under conditions such as these, we might increase our dairy herds by as much as 5 million head over present levels, in order to produce an estimated 25 billion pounds of milk over the 119 billion pounds estimated for 1944. This would call for large increases in hay acreages, necessitating significant reductions in the acreages of the major soil-depleting feed crops.

Of course, such a highly optimistic outlook is based upon assumptions that are only possibilities. However, it may be well to note that these assumptions are not impossible of realization; they can be turned into actualities. They may be regarded as goals to be shot at. Our accomplishments in the war effort should have convinced us of our ability to attain goals like these when we set ourselves to the job in the conviction that the goals are worthwhile. Under the stimulation of wartime demands, goals that seemed unattainable were not only reached but exceeded. We can do the same with these new goals if we want to.



DISTRICT PROFILE

MARYLAND'S JOHN E. CLARK

The sign on a street door opposite the Bel Air, Maryland, courthouse (built in 1788) reads "John E. Clark, Attorney-at-Law." You climb one flight, turn left and walk into a medium-sized room jammed with desks and filing cases.

It's the most flabbergasting lawyer's office you ever saw. In one corner a mimeograph machine is clattering. Two young girls are busy at a table addressing a pyramid of envelopes. On the walls are photographs of purebred livestock, of contouring and strip cropping. You look for the usual legal library, but it must be concealed by the stacks of agricultural periodicals that occupy every available space. Behind one such stack a tall, blonde fellow in spectacles is talking on the telephone—not about filing a brief in the case of Rufferty versus Hooligan, but about the Harford County Horse and Pony Club.

Then you meet the dynamic Clark himself—lawyer, legislator, soil conservationist, writer,

lecturer, organizer, promoter, photographer. After two hours, you go away with very little personal data about this versatile gentleman, for he is one of the very few men you have met who has a genuine "passion for anonymity." But you do carry away the definite impression that here is one of Maryland's most useful citizens. You decide the sign on his door might well read "Agricultural Ambassador and Conservationist at Large." From others you fill in with what you couldn't wheedle out of a man who talks about everything but himself.

You learn, for instance, that he isn't a farmer, although farm reared and a graduate of Maryland's College of Agriculture, Class of '34. He was elected by Harford Countians to the House of Delegates that same year. Since his very first term he has been chairman of the House of Agriculture Committee. In addition to his legislative duties he has been field representative of The State Fair

Board since 1937.

You learn, too, that John Clark is secretary of the Maryland Purebred Society, a group devoted to the export of purebred stock, and for several years has served on the Dairy Advisory Committee of the University of Maryland. You find that he became a lawyer the hard way by commuting to the University of Baltimore five nights a week for three years while serving in the legislature and working for the Fair Board.

As House Agriculture Committee chairman, John Clark is champion of all progressive agricultural and conservation legislation, examples being the Soil Conservation Districts Act of 1937 and the 1943 Forestry Law which sets up stringent regulations governing timber cutting. He is leader of the movement to conserve the state's seafood resources.

As field representative of the State Fair Board John Clark engages in promotional and organizational work all over the state. Nobody knows for sure how many organizations now thriving were originated and nursed through their infancy by the ubiquitous Clark. His articles and photographs, invariably uncredited to him, appear in scads of agricultural journals.

Since he sponsored the Soil Conservation Districts Act in 1937, John Clark has watched districts spread to every corner of the state and has lent a helping hand more than once.

Less than two years ago, at a Friends of the Land conservation forum in Baltimore (he was one of the prime promoters of that, too) John Clark was, as he puts it, "inspired" by a talk by Dr. Bennett and his effective use of colored slides. Checking around Bel Air and other communities, John Clark found that, in general, the townsfolk and the business men, even when they knew a soil conservation district was active in the neighborhood, didn't realize what it meant to them or that they were dependent almost entirely on the topsoil that's still slipping away too fast from the farms of their best customers.

Clark decided he could perform a public service by doing something about this. And so he began taking natural color pictures—he now has over 200—and assembling material. In scores of talks before Rotarians, Kiwanians, Lions, Granges, Chambers of Commerce, Garden Clubs and the like he has hammered across the message that the soil is the lifeblood of the community and its protection is vital to the welfare of every individual. A compelling and energetic speaker, he makes his points stick.



John E. Clark

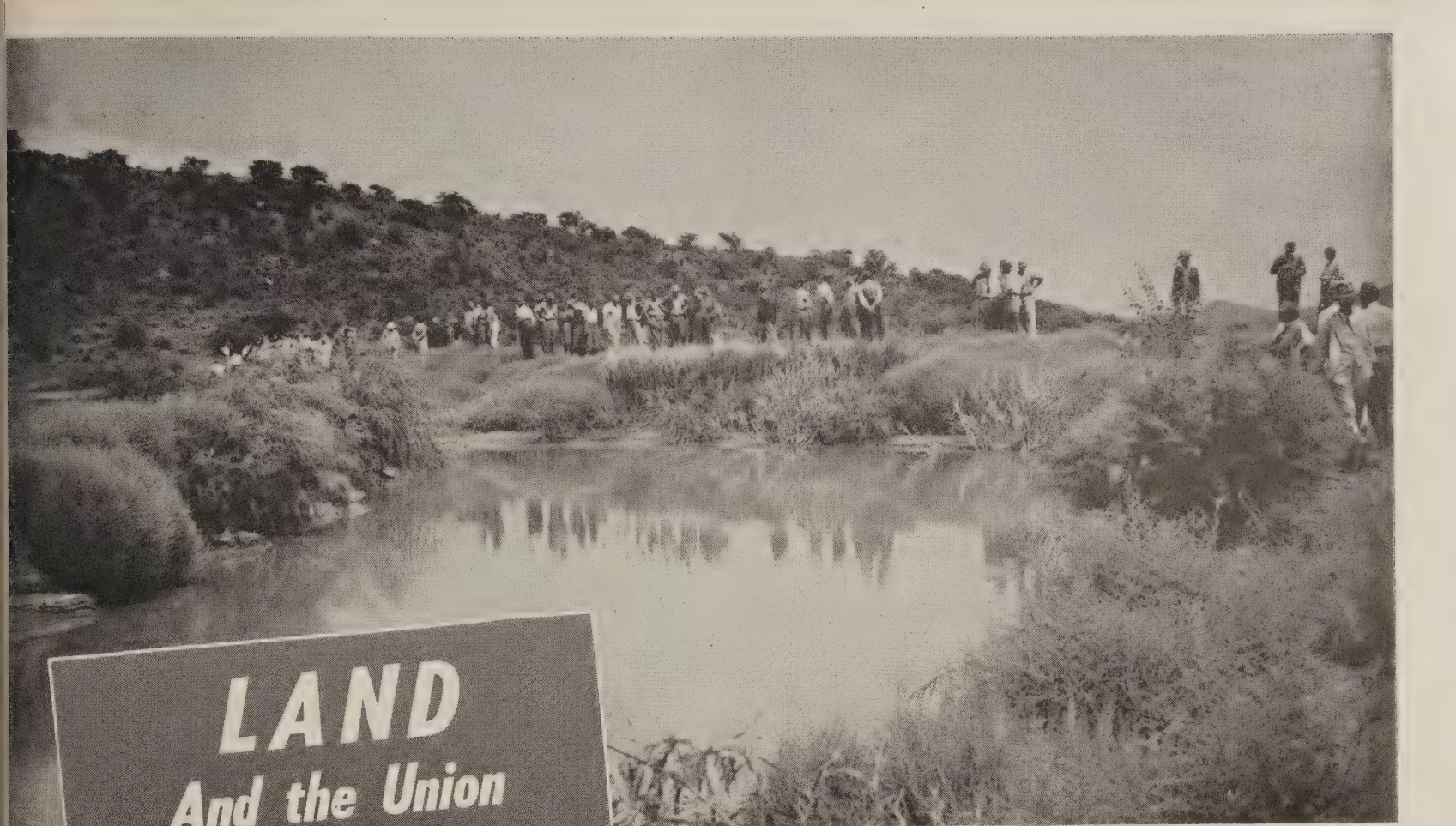
He shows a slide of heavy soil deposition washed onto a road from a cultivated field. "It cost you taxpayers \$200 to clean off that short stretch of road," he says. "But that's only part of the story. Unless the farmer protects that field he won't be a good customer of yours much longer. . . .

"See the difference?" and he throws another slide on the screen. "There's no soil on the road here—this farmer has his field terraced and contour strip-cropped. What's more, he's the man who can buy what you have to sell and whose land will always be able to provide you with the real necessities of life. . . .

"This muddy stream drains through an unprotected and eroding area. No fish can long survive in this soup. Now look at this sparkling stream just a few miles away. Its watershed is protected by trees and grasses and all the cultivated land is on the contour. Isn't that a valuable community asset?"

Another slide. "This field looks pretty and green as we look at it from the road. Let's go closer. Now here we're in the field. See that irregular pattern of openings? The crop grows thin, there, or not at all. In those spots most all of the topsoil is gone and before long they'll be gullies. And then the buying power of another of your cus-

(Continued on page 47)



LAND

And the Union of South Africa

By Hugh H. Bennett

Earth dam walls planted
with grasses and trees
Vlekpoort area.

The article which follows is taken from Survey Graphic for May 1945, by permission of Paul Kellogg, Editor. The issue in which it appeared was devoted to "The British and Ourselves"—the tenth in the "Calling America" series.

Of Author Bennett's contribution, the magazine comments, "His is a variant from other regional articles in this number—an exhibit of scientific interplay, American and British.

"Along with Mr. Bennett's federal service since 1903, have gone kindred exploratory expeditions to Alaska, the West Indies, the Great Plains drought area, to the Canal Zone and Cuba, Central and South America. He bore a major part (1941-42) in the Pan American Conservation Commission.

"From another angle, he throws new light on the dream for 'peace on earth.' On every continent, what is done, or left undone, with the 'earth beneath' becomes of prime significance in underpinning the peace."

In addition to the Chief of the Soil Conservation Service, the distinguished authorship of this outstanding issue of Survey Graphic includes Winston Churchill and Ambassador John G. Winant.

All too often, the last natural resource which a nation decides to protect is soil, although that is wholly indispensable to the life of its people. In the Union of South Africa, happily, there is promise that something positive is going to be done about it.

Last year, when I went there to consult with officials of the Union Government on soil erosion,

I had been given to understand the dominion's problem was a dangerous one, and getting worse. I knew, too, that a special drought committee had made a searching study of the Union's land situation as far back as 1923 and had issued a major report warning of the seriousness of erosion.

Traveling over the country twenty-one years later, I soon learned how many, and how much,

South Africans were concerned about the widespread damage which had gone on for two decades, and the toll it had exacted of millions of people.

Everywhere I went—and I ranged over a very large share of the country—people eagerly inquired whether American experience had anything to offer in the way of remedies for what was literally “eating the heart out of the land.” There was a noticeable impatience for action; complaints that “There is much talk but little done” to arrest the speed of erosion. Others lamented that the country had fallen into the habit of appointing commissions “to study our problems, write reports, print and distribute them, and then forget the whole thing.”

“South Africa in Danger”

Nonetheless, the country was not without its own prophets. A stirring motion picture of uncontrolled erosion—“South Africa in Danger”—was being shown all over. This had been filmed by C. J. J. van Rensburg of the Division of Soil and Veld Conservation—who knows every nook and corner of the Union and has done much to awaken people to a menace which had grown progressively worse since the Twenties, when the Drought Investigation Committee had driven home:

—“That soil erosion is extending rapidly over many parts of the Union.

—“That, besides slooting (gullying) there is a great deal of surface erosion, both by water and wind, taking place.

—“That the soil of the Union, our most valuable asset, irreplaceable and definitely limited in amount, is being removed in enormous quantities annually.

—“That a great part of this soil and valuable plant food is lost forever . . .

—“That great damage is done by the eroded material silting up reservoirs and that soil erosion causes greater irregularity in the flow of our rivers, thereby increasing the cost of irrigation work . . .

—“That soil erosion is causing a marked decrease in the underground water supply of the Union, and thereby increases the difficulty of watering stock . . .

—“That soil erosion has a cumulative character which . . . accelerates its rate. . . .

—“That prompt action is therefore imperative.”

Meanwhile, agricultural experiment stations in South Africa had acquired much practical information about effective anti-erosion measures, especially in combating widespread damage to range land through improper stocking. Notwithstanding

these efforts to better conditions—chiefly educational—I soon discovered the existence of two sinister situations I had hoped not to find. These were: active erosion on almost all agricultural land; and all but nothing done to stop the damage.

The Sin of Sheet Erosion

It seems strange that agricultural specialists traveling widely about the world have seldom reported adequately on the extent, location, quality, and condition of productive areas. Fingers of warning have often been pointed at China as the world's outstanding example of horrible land debauchery, whereas the earth virtually everywhere is handicapped by countless tracts of erosion-impoverished land.

Perhaps this is accounted for by a common lack of understanding of the disguised violence of much erosion, its deterrent effect on agricultural production, and even more on health and human welfare.

Anybody who looks about him can readily enough recognize erosion at work in yawning gullies. Some of them are hundreds of feet deep; and a glance shows why such lands cannot be cultivated any further. What many people don't see, however—and therefore don't understand—is the effect of what is called “sheet erosion,” a less spectacular form which has gnawed away the foundation substance for millions of the world's people.

The reason why so many people are unaware of its disastrous effects is that they do not distinguish “topsoil” from “subsoil.” It is high time that human beings be informed, from school days on, that topsoil is the productive surface layer of all land, generally no thicker than 8 to 12 inches. Subsoil is the material lying immediately beneath it—*poorer*, less retentive of rainfall, more difficult to till, and, to use a less familiar term, more erodible. Every rain heavy enough to cause water to run downhill across unprotected slopes removes a thin layer of topsoil. This is carried away in suspension, as so much “mud” in the run off. The process may affect large areas so uniformly, so gradually, that even farmers fail to recognize what is happening and accordingly do nothing about it.

This erosion process is not just a technical item of hydraulics or a simple matter of the mechanics of farming. People don't go out and wilfully destroy their farm lands by swapping good soil for poor. Nevertheless, failure to recognize the deadly meaning of erosion and the utter necessity of stopping it is, I think, not only the most ignored but the most upsetting sin of man. It has been gen-



Gold coast strain of Napier fodder at Westfalia.

erally overlooked across the centuries—left out of our serious economic and social considerations, out of our conferences and discussions, national and international. Yet it probably lies closer to the roots of human want, fear, and strife than all other causes.

There are two other things most people, South Africans included, have not clearly understood:

- (1) that food comes from productive land and nowhere else; and
- (2) that productive land around the world is already scarce and getting scarcer.

Bare Footholds for Livelihood

In many places throughout South Africa I found that much formerly good land had literally washed—shall I say—from beneath dense concentrations of natives.

Thus, one very large area in Natal that I examined in detail presented the pitiful spectacle of completely devastated land, with both soil and subsoil washed off down to bedrock, and the people

generally stranded. Some were going considerable distances from their huts on the wrecked land to find diminutive parcels of ground for growing corn—their staff of life. Some men were trekking hundreds of miles to work in the mines of the Rand district about Johannesburg. Many of these people were not just undernourished, they were underfed.

What makes the problem even more difficult is that good land to which they might be moved is getting scarcer all the time. What gives it a silver lining of hope is that the wind and water erosion which causes it could be controlled rather easily.

Many of these wrecked areas are on “labor farms.” The land on such tracts is turned over to natives by the owners to do with as they please, without rental or charge, other than that sometime during the year they must contribute half their time in labor on the owner’s nearby or remote farm.

Thus, part of South Africa’s irreplaceable resource of productive soil is actually being used, per se, as a medium of payment for farm work. The native, knowing nothing of modern methods of soil conservation, habit-formed to ancient ways of wasteful farming, allows the soil to wash off—often, in reality, more rapidly than he could dispose of it by loading dirt on a truck and hauling it off to a dump.

In another locality—the area between Pietersburg and the Drakensberg highlands in northern Transvaal—we found a solid block of more than 100,000 acres of good land, formerly used by natives and Europeans, which had been literally stripped of its topsoil. Here, as in thousands of other places, nothing whatever was being done to hold the soil against wind and water.

Cultivation generally is performed without regard for the contour or soil-building crops. Animal manures and cornstalks are used for fuel; and every vestige of crop residue left in fields is grazed down to the bare surface of the ground, leaving the soil exposed to the lash of wind and water. Present yields of corn on such land range all the way from nothing to about 3 bushels per acre—not enough to sustain life.

From Free State to the Great Karoo

In the Orange Free State we traveled over 200 miles along main highways without seeing so much as a single field in which any kind of soil protection or soil-building rotation was being practiced. And this was in a region where good land is suffering extensively from erosion.

Far to the south, toward Capetown, destructive erosion is under way over practically the entire regional wheat belt. Formerly the best wheat lands of the Union, many of them had had to be abandoned because the soil had been so thinned down over the basal rock that it was no longer deep enough to plow. The wastage in remaining fields is faster than ever.

Over a large part of the Great Karoo, a shrub-covered region lying between dry or desert country to the west and the eastern section, with its higher rainfall, erosion is fast spreading disaster over millions of acres. This region is famed for the easy fortunes that once were made here in sheep raising. Only where the land has been wisely protected is it good sheep country today.

Never before have I seen more land mismanagement than on the hills and mountains slopes of the Karoo. These highlands have been burned so repeatedly and over-grazed so long that the natural sponginess of the ground has been practically destroyed. Rain formerly soaked into retentive vegetation. Now it runs off as from a metal roof, spreading sheets of torrential flow over the nearby flat lands. Thus the topsoil has been swept from a vast area, where to begin with, it had only shallow depth over rock.

As speedily as possible the highlands of the Karoo—as well as most of the other hill and mountainous areas of central and eastern South Africa—should be acquired by the government, fenced and protected against fires, and grazed under the most careful restrictions. Some areas should be planted to trees. It is still not too late to bring back some degree of former well-being to the region.

In general, bad conditions of erosion are so prevalent that there must be put into effect, without more delay, a really vigorous national soil conservation program, if South Africa is to survive in any sound agricultural sense. About half of the virgin fertility of the land has been lost—and the rate of erosion is increasing. Three or four more decades of doing nothing (beyond offering farmers payments for this or that) will see the southern half of the continent fading from the scene as the seat of a vast community. There may still be diamonds to mine, and gold there, but these have no nutritional value.

Erosion Control

Control of erosion calls for the treatment of land according to its adaptability and needs through the use of scientifically applied measures. There are no short cuts about the job. No two

farms are exactly alike so that formulas, like those used to build small dams on almost any stream, are of no avail in this complicated task which is to control water and wind on land of complex soil and topography. Most farmers do not have the special training needed for installing, for example, efficient water control systems or a good enough layout of wind-resistant strips of vegetation.

Individual farmers can be required to abide by certain practical rules in the operation of their farms—such as burning the carcasses of animals that have died of contagious diseases. But proposals to force them to control erosion in an over-all way amount to little more than nonsense. In countless instances—generally, in fact—they do not know what to do; they need technical assistance. This assistance the government should provide as its rightful share of the job of keeping land permanently productive for the permanent welfare of the nation. It may not be safe to bet heavily that other nations will always be willing to sell off their irreplaceable soil productivity in the form of food crops for export.

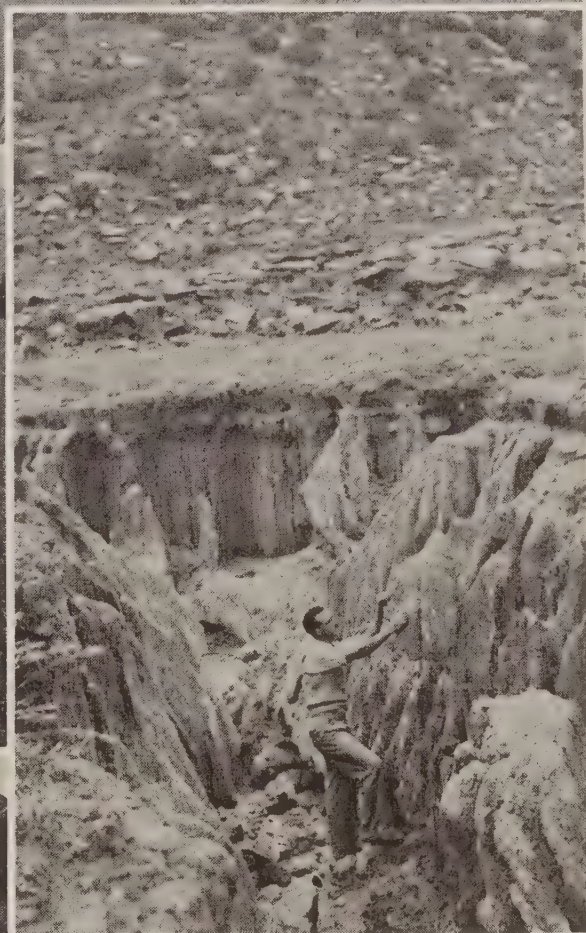
The job of erosion control is not so complicated, however, as to be in any sense impracticable. As a matter of fact, it is easier, cheaper, more remunerative, to farm with conservation measures than by the ordinary wasteful ways. It takes less gasoline and less time, for example, to plow across slopes on the level—on the contour—than to plow up-and-down slopes; and it is also easier on animals and men to plow on the level. Moreover, per-acre yields are increased with conservation farming, and this means more income to the producer.

I pointed out to members of the staff of the South African Department of Agriculture, Native Affairs, and others interested in conservation matters, that their job should prove considerably easier of accomplishment than ours has been in the United States. Smoother slopes prevail and there is greater variety of useful, soil-improving, and soil-holding grasses available under almost all conditions of land, slope, and rainfall.

South African Demonstrations

Traveling about, studying the country in detail, brought us into contact with occasional farmers who had sought and made good use of the advice of South Africa's capable technicians. On their lands we found excellent examples of erosion control on field and range.

One Transvaal farmer—Dr. Hans Marensky—has contour-planted on a rather large scale and



Top: Left, natives at Aliwal North, Eastern Province; right, reclaimed donga, Ladybrand, Free State.

Middle: Left, wheat fields, Caledon, Cape Province, all of them sheet-washing though not so rapidly as on steeper slopes; right, donga eating through the mountains, Free State.

Bottom: Left, note great depth of alluvial soil in some parts of South Africa's Karoo. This 25-foot gully was formed in such soil by the increased runoff from mountains that have been stripped of water-holding plants and spongy topsoil by burning and overgrazing. Right, natives carrying tall Cymbopogon for thatching.

obtained excellent results in growing citrus fruit, avocados, and bananas, with conservation farming. By returning to grass and indigenous growths those worthless slopes that had been abandoned because of erosion, he has not only restored the land to a condition favorable for grazing but has brought back to life springs and streamlets that had gone dry. And the water thus held back from the heavy flood-flows coming off eroding land is now being used downstream for stock water and for the production of feed needed to carry animals over the dry period of late winter.

In Swaziland, we saw some highly successful work done with contour-embankments and even more of this in Basutoland, where the farmers are mostly Negroes. Specialists, some of whom had spent considerable time studying our methods in the United States, had returned to Basutoland and helped the natives start an extensive program of soil and water conservation work which already has pushed corn yields up from around 3 bushels to 12 to 15 an acre.

I asked one of the Basuto chiefs how his people like this sort of work. He said: "We were scared of it at first; we didn't understand. Now we have seen the good of it and consider it a blessing. It not only prevents the formation of dongas (gulies) but gives us more to eat."

So I said to my South African co-workers: "Look! You've been talking about unsolvable, moderately difficult, and intermediate problems of erosion while, here, stretched out before us are 10,000 acres in a solid block where Europeans and natives, helping one another, have completed a splendid job of modern soil conservation. If they can do it, why not you South Africans?"

From the Ground Up

On my arrival in the Union, I had let it be known how much I preferred to base any suggestions on outdoor studies of the land rather than on bulletins, reports, or discussions about tables, whether round or square. My proposal was accepted and I was invited to speak out in any critical way I wished.

This I did, and it helped us to develop and present at least the framework of a plan for going ahead with a comprehensive, national program for the conservation and wise use of South Africa's agricultural lands. This plan cannot be given here, but it was based to a considerable degree on the national soil conservation program which has proved its worth in the United States.

If adopted, this plan will succeed and it will

help solve, also, some exceedingly difficult human problems—some of them so tough that most people have tended to look at them and leave them alone, or branch off into a lot of academic, political, or impractical theorizing.

The most fundamental characteristics in the whole social economy of South Africa, is its dwindling agricultural productivity. The great masses of people—the eight or ten millions of Negroes—live on and by the land, and yet in some provinces they cannot even own land. The matter of land ownership could be arranged politically, but the productive soil, now eroding away so rapidly over most of the country, cannot be handled politically or in any other way *after it's gone*.

Already there is acute need to move thousands of people from wornout land to land where there is a chance to grow something. Resettlement of this kind, necessary as it is in the numerous impoverished localities, is difficult under any circumstances. Reasonably good land available for settlement is already scarce in most sections because the land impoverishment and wreckage by unbridled erosion has been going on for too many years.

This problem of land for people indeed is a tough one—so tough it is heading the country steadily toward an impossible situation. There will have to be a reckoning sometime, and that may not be as far off as those who trifle and delay with so dangerous a matter seem to think. For there is a tendency to let things drift in the hope that the situation cannot get any worse and may somehow get better. This attitude is pure delusion. Clear-thinking people in South Africa understand that the so-called insolvable problems themselves are not just drifting; they know they are getting steadily worse.

I advised my South African friends, with every persuasion at my command, that they should at least save their remaining area of productive land. That alone might go a long way toward solving their most immediate, troublesome and dangerous economic difficulties; might avoid a lot of political difficulties.

There is a relatively small but mounting number of South Africans who know that the life of the nation depends on saving its agricultural lands. Diamonds and gold are precious things to have—and they have them—but they understand that the country has on its hands, also, plenty of deep-seated, smoldering social and racial trouble, a good deal of which is unnecessary.

(Continued on page 45)



A VETERAN MAKES A PLAN

By M. H. Cohee

Typical production unit nearly everywhere is the family farm. Each farm, each ranch, is virtually a complete business entity. Four items largely govern its activities: land, labor, capital, management. Its system of conservation farming is determined further by the interplay of physical factors, economic considerations, and the human element. Farms, operators, market prices, production costs vary in detail with each county, each community, indeed each R.F.D. mailbox. We can go only so far, therefore, in generalization. Only up to a certain point can soil conservation be considered with farmers by groups.

Thus, at the outset, the soil conservationist should recognize that even the well established farmer must weigh many things before changing his business to incorporate the desired soil and water conservation measures. In this respect, the picture with regard to a returning veteran is little different from that of other farmers in the community where he proposes to root himself in the land. The chances are more than 50-50, however, that the farm-bent veteran will take up farming within a soil conservation district, in companionship with approximately 3,400,000 other farmers now within 1,350 districts.

These local units of government, soil conservation districts, have as their purpose the conserva-

tion of soil and soil resources and the prevention and control of soil erosion. They have much to offer in the way of advice and help to the returning veteran and other farmers in the district who want to farm the conservation way.¹

AN APPLIED SCIENCE

The veteran has heard of "conservation farming," and wants to understand more fully what it means.² Just how can we explain? We can tell him that soil conservation is one of the newest applied agricultural sciences. Further, we can state its basic, guiding principle as follows: "Effective prevention and control of soil erosion and adequate conservation of rainfall in a field, on a farm or ranch, over a watershed, or on any other unit or parcel of land, requires the use and treatment of all the various kinds of land comprising that area in accordance with the individual needs and adaptabilities of each different area having any important extent."¹ He will then want more specific, concrete information as to methods of developing a farm or ranch conservation plan.

The veteran-farmer might well remember that in a soil conservation district today—where several agencies are assisting a district with its work

¹ Guidance to veterans going into farming is treated in "Soil Conservation Districts and Returning Veterans," May issue *Soil Conservation*, by the author.

² Chapter 10 in the booklet "Managing a Farm," November, 1944, prepared for and used with armed forces by The United States Armed Forces Institute, treats the importance of soil conservation to the success of farming.

NOTE.—The author is Chief, Project Plans Division, Soil Conservation Service, Washington, D. C.

—the expression **farm conservation plan** does have a definite connotation. All the phraseology used to describe this meaning merely reflect the basic guiding principle stated above.

ESTABLISHES COURSE OF OPERATIONS

The concept of the farm conservation plan was developed some years ago by the Soil Conservation Service. It has been adopted in principle by practically every soil conservation district in the country, and is well understood by thousands of farmers. Such criticisms as may arise usually are about methods, or tempo of operations, rather than about fundamentals. But farming itself is not simple or standardized. And we cannot apply any rule-of-thumb in appraising the physical characteristics of each acre and each field, in considering the economic aspects of the farm business, and in adjusting a plan to the aptitudes and desires of the tenant or owner.

The farm conservation plan has soil and water conservation as its central arch. This immediately distinguishes it. Like most plans, whether for industrial enterprises, urban retail stores, or a host of other businesses, the farm conservation plan is not an end in itself. The real objective is for the farmer to make a creditable living for himself and his family, and at the same time treat his land in such way as to assure continued economical production. The farm conservation plan is the outline of a course of operations designed to safeguard the producing capacity of the land, hold the soil in place, and insure a "going business."

The farm conservation plan starts from two broad bases: 1. the existing plant, 2. the obviously needed changes in use. The physical plant is gauged according to the land capabilities of each acre and with an eye to present usage. Needed changes—conservation measures—are dictated by sound management, economic feasibility, and the aptitudes and desires of the farmer himself.

Practically all the desirable agricultural land of this country is now in farms or ranches. There is small opportunity to develop a farm conservation plan for land never before in a farm or ranch. Usually, planning pays its dividends through invoking changes in already existing operations and management. Now and then, however, farms are divided or combined; the farm conservation plan then becomes an essential tool in the shaping of a virtually new unit. Whether the owner or operator is now on the farm or is a veteran just coming onto the land, the principles remain the same. Conditions are inventoried and a pattern of operations developed which includes adequate conservation

measures. Rarely would it be possible for the professional agricultural worker—even if that were desirable—to develop such a pattern alone and come out the same as when the farmer takes part.

PEOPLE LEARN BY WRITING AND READING

Discussion of farm conservation plans sometimes centers in whether or not they should necessarily be reduced to writing. Why do people **ever** write? They write for convenience, when verbal conversation is not practicable at the moment. They write as an aid to the orderly arrangement of ideas. They write to produce information for record.

Once a farmer has his farm conservation plan well in mind or applied on his land, he may not greatly need a written plan. Nevertheless, the writing of the plan helps tremendously in getting the proper operations, singly and in combination, on the face of his property. He has the written plan at his elbow for frequent consultation while the measures are being installed or maintained. Better yet, he finds it useful to agencies and individuals helping on his farm and other farms. And should he sell or lease his holdings, the plan becomes a part of the "value received"—a guide to those who will carry on. The farm conservation plan, therefore, stands first as a written document, and second, as the living means for putting conservation on the farm and keeping it there afterward.

EXAMINE LAND AND COVER

Many are the "tools" useful in formulating the farm conservation plan. They vary, farm by farm, ranch by ranch. First, comes knowledge of soils and topography—each acre, each field. Are the soils deep or shallow? Is the land badly eroded, moderately worn, or but slightly damaged? What is the slope here—there—yonder? What of water disposal, use-pattern, drainage, gullies? All such information—and more—goes into the making of a land capabilities map. This map puts the land into one or more of eight classes, depending upon (a) its suitability for cultivation or other uses such as grazing, woodland, or wildlife; and (b) the need for intensity of conservation measures—such as cover crops, strip cropping, terraces, and so on. Range land is tabbed according to the grazing conditions—reflects the range. Condition classification establishes the degree to which a given grazing area approaches full potential productivity.

Armed with this inventory of physical information, the needed land use can be outlined for each

field or other part of the farm or ranch. This is not to say that at this stage in the formulation of the farm conservation plan all of the indicated land uses and conservation measures will be included.

GOOD FARM ORGANIZATION IMPORTANT

Next, we take a look at the economic aspects. What are the farmer's present cropping and grazing programs, his equipment, his buildings and water supplies and fences. In short, how is the farmer or rancher using his land from a business standpoint, and what working resources are involved in present operations? It is to be remembered that there is great rigidity in the production program of the usual farm—there is a relatively high percentage of fixed expenses. The practical farm conservation plan will adapt itself to the hard realities and call for a sensible sequence of changes.³

The present organization and management of the farm will largely shape the nature and extent of the transformation to be wrought. Into account are taken the possibilities of broad production adjustments and "outside the farm" influences. Long time shifts in market demands and outlets, as well as changes in costs of production because of technological improvements such as equipment, new varieties of seed, improved or new uses of fertilizers, etc., should not be overlooked.

THE FARMER RUNS THE FARM

Last but not least in importance, is the farmer himself and his family. The farmer may not desire or be able to take advantage of the most promising farm conservation plan ever devised. He may not have the necessary experience and background to draw upon the production of a new crop or for the establishment of certain livestock enterprises or for the application and maintenance of a conservation practice. Furthermore, he may prefer not to grow a certain crop or have a particular type of livestock or maintain a conservation practice—for example, many farmers do not want dairy cows because they do not like to milk or because they do not want to be subjected to the year-round routine of caring for the herd and milk equipment. Consequently, the planning of the land use and cropping pattern must take into account the entire farm organization possibilities not only from a physical and financial view but also because of the farmer's desires and abilities, and those of his family.

The present farmer, or the veteran who is establishing himself as a farmer, then, with information along the lines of these three groups of factors, and with assistance in the interpretation of the facts, can decide upon what his farm conservation plan shall be. It may not be perfect at all. With the shifts in demands for agricultural farm products (and this will undoubtedly be true after the war) and with changes in prices and production costs, there will have to be modifications in detail. This very moment is one of the best times to prepare for future changes. For those parts of the farm or ranch on which, because of physical conditions, the desirable land use and conservation measures are well fixed, the farmer right now would be wise to make a decision looking far ahead—make up his mind to get such areas under a permanent program. There may be other parts of his farm subject to alternative uses—uses involving the intensity of cropping, or shifts from crops to grazing and back again. On these areas treatment may be applied which will allow flexibility.

The farm conservation plan should permit all likely contingencies. It does not necessarily follow, however, that the farm conservation plan should include every detail pertaining to the management of crops, livestock, and marketing. Nor does it deal with the intricacies of home economics or home management, although it takes into account, perhaps, the location and size of the farm garden, together with the necessary conservation practices. Specific vegetable and canning recommendations are omitted. Far too frequently, however, the erroneous conclusion is drawn that the omission of such specifications means that only the physical factors enter into the formulation of a farm's conservation plan. Farmers themselves rarely share such confusion.

Sometimes it is proposed that all kinds of farm plans should be molded into one—a lengthy, comprehensive document blanketing the need of the farm, the farm family, and the farm business. This would be comparable to writing an all-over insurance policy covering automobiles, life, personal accident, education, fire, and crops. Such farm plans have occasionally been attempted in the past, only to fail by their utter impracticality—always they have been out of balance, cluttered, wasteful of effort, universally disappointing. Farmers as a rule are fairly good business men. They run their farms not too badly. They do not need every phase of their business spelled out to the last detail. Their wives, too, are probably above the average as household managers, and do

³ Two articles in the May, 1937. *Soil Conservation* go into some detail in these economic aspects, "Farm Management Information Needed in Farm Planning" by E. H. Reed, and "The Application of Farming Management Data in Farm Planning" by Melville H. Cohee.

not need to be told how to parcel their time or attention.

A FARM CONSERVATION PLAN

Conservation of the soil, and the conservation, use, management and disposal of water, are so intimately associated with each other that the farm conservation plan must necessarily take both soil and water into account.⁴ Space does not permit the citation of examples of a farm conservation plan for each broad area of the country having significant differences. In broad outline, the farm conservation plan is the same in its concept and execution in humid and subhumid regions, in the Cotton South, in the New England dairy region, in the corn-hog Middle-West, in the Great Plains grazing country and in the Pacific Coast citrus-growing sections.

Take, for example, an 80-acre farm in the Corn-belt. Joe Thompson, just released from the armed forces, has selected this farm for his own. It is just a little smaller than he had wanted, but perhaps later on he will add to it. This returning veterans wishes to know what are the physical characteristics of each of his newly acquired acres. He has the general picture, but in building his farm conservation plan he must have a breakdown of definite information.

His soil conservation district will provide technical assistance. Soil Conservation Service men are assigned to it for that purpose. One of these men will make a conservation survey of Joe Thompson's farm. (Figure 1.) Serious erosion has taken place in the small northwest meadow field, in the northeast corner, in the southeast corner, and also right in the middle of the farm on land partly in cultivation and partly in pasture. These areas are rolling or steeper than some other parts of the farm. The soils are far from being worn out, however; some, in fact, are of the same type as on other parts of the farm not damaged so badly. Tama silt loam predominates. The surface soil is dark, grayish-brown, silt loam—when wet it appears almost black. The subsurface soil is a dark, yellowish-brown silty clay loam. Both soil and subsoil are acid. Natural drainage is good throughout.

On a conservation survey map is delineated each part of Joe's farm which differs in combination

of four things, namely: (a) degree of erosion, (b) present use of the land, (c) slope, and (d) soil type. For convenience in use, and ease of understanding, it is most common now that upon the basis of these factors the farm be delineated into different areas on a map according to land capabilities. (Figure 2.) The draws and serious gullies are also mapped; likewise, the present field boundaries, as well as certain other features.

Immediately this information supplies a land use guide to the soil conservation technician and to Joe Thompson. From it, they see at once the southeast corner of the farm should go to trees. They know, also, that with improved management the present permanent pasture area may be retained. The drainageways need treatment—they are seriously eroding, and the lack of production from such areas constitutes an ill-spared part of the farm business. In fact, one of the drainageways needs more than vegetative protection at the lower end—it needs a dam.

The technician and Joe Thompson talk it all over. Joe feels that he must farm somewhat intensively if he is to have enough feed to take care of the cattle he wants and needs to keep, and to maintain a few hogs, some chickens, and two horses. He does not feel, therefore, that he can follow one alternative course of treatment on the suitable cropland area, namely, a crop rotation in strips on the contour that would call for two or more years of hay out of each four. There simply would not be enough corn or other row crop, no matter how desirable as a means of maintaining soil fertility. Joe understands the principle of strip-cropping, however, and decides that this practice will be necessary, and since he will have a medium size tractor, it will work out all right.

Joe has another option open. He and the farm conservation planner soon get on with it. They decide to terrace the north part of his cropland—in fact, it really needs terraces anyway. The crop fields south and southeast of the farm buildings lie level to undulating and contour strip-cropping will serve those lands well, even with a relatively short crop rotation. Thus it is that Joe Thompson can raise the needed row crops each year to round out his livestock feed requirements. Three of the more seriously eroded areas of cropland, also in the proposed contour strip-cropping system, prove to be “odd shaped” fields or parts of strips, and are allotted to permanent alfalfa.

Joe Thompson will build his own terraces after they are staked out by the technicians of his soil conservation district. He not only wants to prevent paying out-of-pocket cost for this work, but he

⁴ The inter-related importance of water and land is apparent from two articles appearing in the January, 1940, *Soil Conservation*: “The Water-Facilities Program,” by Karl O. Kohler and James A. Muncey; and “Our Drainage Problems” by John G. Sutton.

⁵ Illustrations from different parts of the country are carried in an article “The Coordinated Approach to Soil Erosion Control,” By E. J. Utz, 1938 USDA Yearbooks of Agriculture. Also see previous issues of *Soil Conservation* as follows: September, 1937—“Farm Planning” by H. C. Diener; December, 1936—“Looking Down a 5-year Road in Southwestern Ohio” by Wellington Brink; March, 1938—“How I Plan to Use Experience Acquired in an SCS-CCC Camp” by Cecil Giesler.

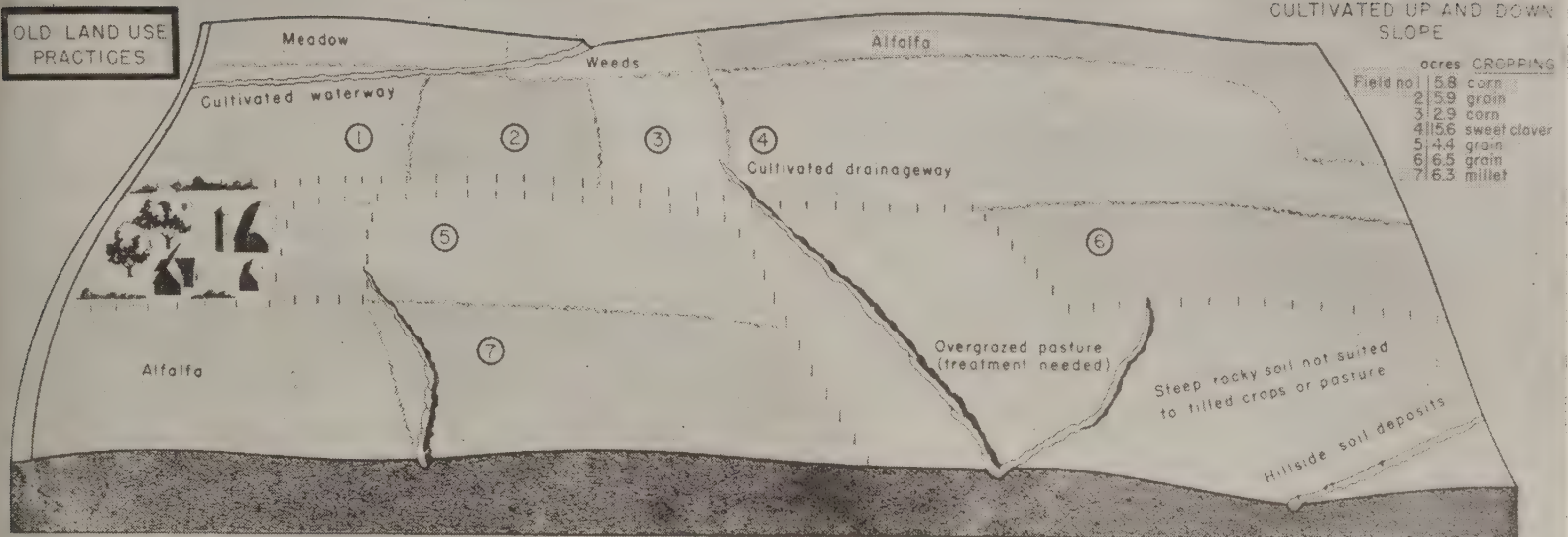


Figure 1.—This is the farm, as it was before conservation planning.

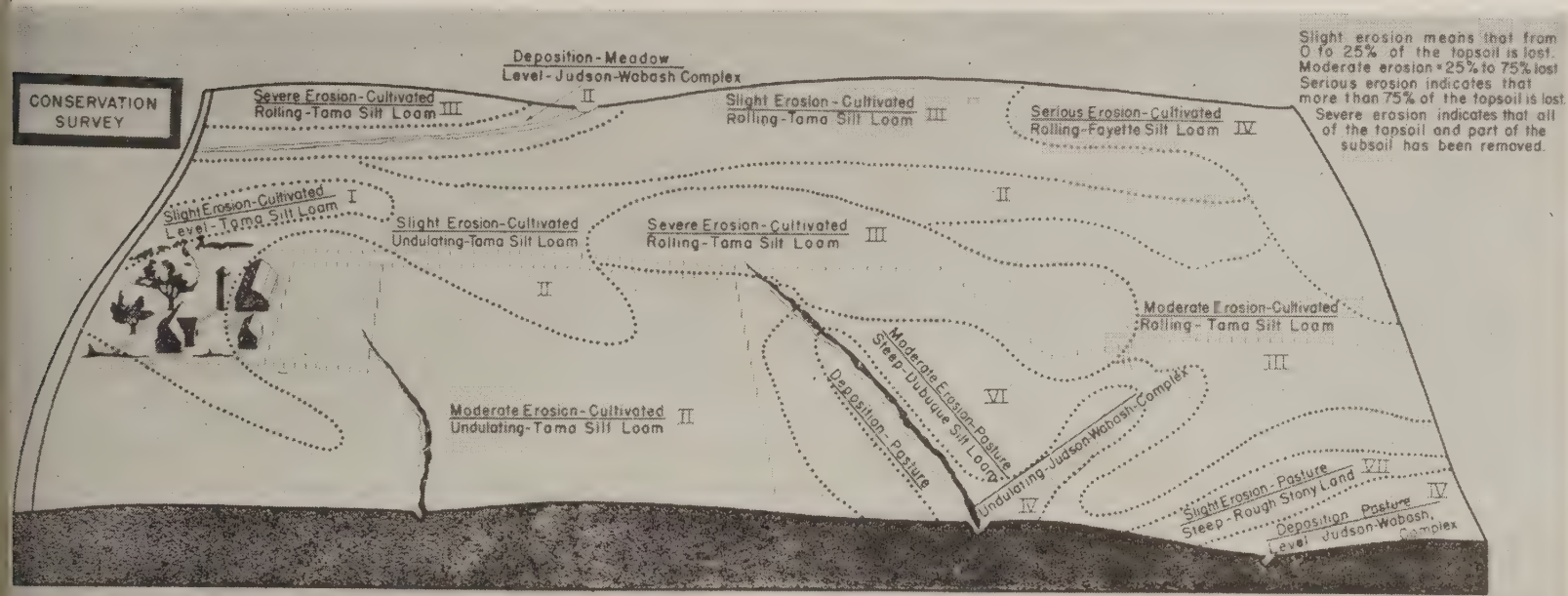


Figure 2.—First step was to map the land according to its productive capabilities.

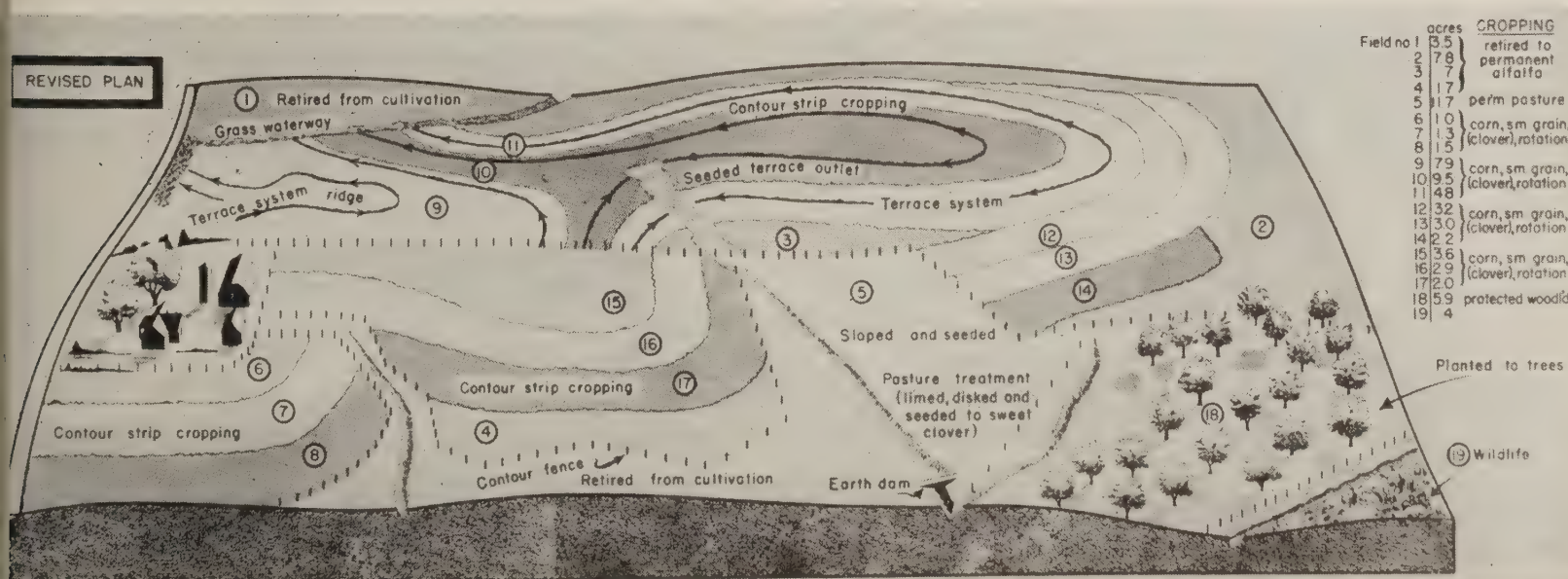


Figure 3.—The new plan, shown here, fits the use to the land. Soil conservation aims to assure the future of this farm as an economic unit.

wants the experience. Joe believes that since his farm contains but 80 acres, he may have some extra time to do custom terracing work for his neighbors.

The proposed small planting of woodland in the southeast corner of the farm bothers Joe a little. He feels at first that it might be better to have these six acres in pasture. After studying the conservation survey information further, however, he realizes that on this steep, rough, stony land there is not likely to be much grazing. Furthermore, he will require fence posts, and there is no woodland on the farm at present.

Another bothersome problem hinges on the grazing of crop residues and aftermath. It would be impracticable to have permanent fence on each side of every strip. For the present it is decided to use electric, portable fencing whenever it is desirable to turn livestock onto cultivated fields. Perhaps in the future a field unit system can be developed so that with a longer rotation, some first-year and fourth-year hay will be on alternate strips and the field unit may be used for some summer pasture—but this will probably not be practicable until Joe enlarges his farm.⁶

All these things are jotted down as Joe Thompson and the soil conservation technician go over the farm. The future farm layout map begins to take shape. (Figure 3.) For each field, or group of fields (strips) being treated as a unit, a brief narrative statement is written. In this are the pertinent facts about the soil conservation practices to be carried out on all fields—crops, grazing, woodland, wildlife. Yes, Joe Thompson will have a small special wildlife planting for song and game birds — even though it comes to less than half an acre.⁷ The narrative and tabular parts of the written plan are commonly referred to as “the plan of conservation operations.” It by no means covers all the points taken up by Joe and the farm conservation planners.

Joe Thompson and thousands of other farmers get interested in soil and water conservation problems as they watch the work of different agencies. Still more of them are drawn in by the presence of local soil conservation districts. Irrespective of initial introduction and contacts whether through the Soil Conservation Service, the State Extension Service, the Agricultural Adjustment Agency, the vocational agricultural instructors — Joe and his family stand to benefit from the development of a

farm conservation plan. This “development” entails not only the formulation and application of the plan, but also its faithful maintenance through the years.

FLUID INSTRUMENT

The farm conservation plan is not rigid and immovable. Once decided by farmer or rancher what land shall be in cultivation and what in grass or woodland, together with soil conservation practices for each, it may still take 4, 5 or even 8 years to install all the measures. At the outset he may find himself with two groups of measures—1. those he intends to carry out just as soon as he can, and 2. those other measures recognized as desirable but which he may not be able to get on the land immediately. Then, with both groups of measures at work, there's still the obligation to maintain and improve. As the plan takes form, revisions and refinements are in order. Research has brought along many new methods and practices, and research will continue to pioneer along the conservation trail. Furthermore, Joe and his contemporaries gain confidence and wish to go farther than originally contemplated. Joe may decide to terrace some of the fields on which a fairly good job already is being done by contour strip-cropping. Or, he may find his farm profits falling in different pockets. Or, he may merely change his ideas regarding the intensity of farm operations. As Joe grows older, he may incline toward a shift in organization to a more extensive type of farming—want more hay, grass or woodlands.

EACH CONTRIBUTES TO WHOLE

Dr. Hugh Hammond Bennett has stated, “Appraisal of the importance of the land to national welfare demands consideration of the future and recognition of the land as a resource that needs to be defended forever in order that it may remain productive and continue to support the population. The land is owned and used by many men. National conservation action must spring from the people on the land, and to a large extent, be advocated by them as individuals, with the help of the government.”⁸

The farm conservation plan affords each farmer or rancher the “course of operations” that will safeguard his lands. As he follows this course he furthers the welfare of the nation as well as that of himself, his family, and his community.

⁶ See “Field Unit Planning” by Harry H. Gardner, April, 1941, *Soil Conservation*.

⁷ Wildlife benefits are definitely taken into account in the development of a farm conservation plan. April, 1942, *Soil Conservation*.

⁸ From *Soil Conservation*, H. H. Bennett, McGraw-Hill Book Co., 1939.

South Africa could not possibly do anything that would help the country so much as to put idle people to work rebuilding and stabilizing its land resources. This would improve land sorely in need of protection, and it would help utilize and conserve a great part of the nation's human resources. The immediate benefits to the people engaged in such a program would be outweighed only by the advantages that would accrue from such work itself across the long span of the future. The social and economic health of the Union of South Africa in the years to come is certain to be conditioned, in a most vital way, by the health of the nation's agriculture, of the millions who try to live by it today, the other millions that will seek the same livelihood for many tomorrows.

If the years ahead are to be years in which the nation steadily increases its importations of food and fiber to compensate for the dwindling productivity of its own land, and if at home there is increasing dependency by all on the gold and diamond mines for their livelihood, the years ahead will be years of mounting trouble.

Looking Ahead

I cannot believe the Union of South Africa will forsake agriculture. Something worthwhile and on a wide scale is bound to be done about erosion. Of course, something has already been done here and there—enough to prove its practicability. A number of Conservation Areas already have been established under conservation laws. The Drakensberg Area in Natal comprises 3,000 square miles of severely eroded land along the Tugele and Mooi Rivers. The pressing thing now is to adopt a nationwide plan. The call is for action.

You can neither keep land productive nor improve impoverished land except by action *out on the land*: by applying such proven measures as contour cultivation, water retardation and conservation, strip cropping and terracing; by such measures as rotation of crops with soil-building legumes and additions of animal manure and compost; by retiring steep slopes to the production of trees and grass, and so on.

In my last talk with newspapermen before I left the country, I couldn't resist saying: "If this nation doesn't awaken to its land responsibilities within the next two or three decades you will have lost the fertility of your soil—and then God help you!"

LEGUMES HARNESS BACTERIA

By JOHN P. JONES

Good farmers use vegetation for the threefold purpose of conserving soil and moisture, and of improving soil. Vegetation achieves soils stabilization which, in turn, permits fertility developments. Legumes work well with other vegetation, and we are constantly seeking new and improved varieties, because of their capacity to collect nitrogen from the air—a peculiarity which makes them invaluable as soil improvers.

Legumes collect nitrogen from the atmosphere by what is known as the symbiotic process. This process gets its name from the Greek word that means living together. Symbiosis involves the living together in more or less intimate union of two dissimilar organisms, and is usually applied to cases where the relationship is beneficial to one or both. The collection of nitrogen from the atmosphere by legumes is commonly called symbiotic nitrogen fixation.

The two organisms involved in nitrogen fixation are the legume and bacteria, scientifically known as *Rhizobium*, which live in the root cells of the host legume plant.

The nodule bacteria invade the roots of leguminous plants through the root hairs and set up housekeeping in the cortex. There they multiply and the cortical cells are stimulated to increase in number. This multiplication of the cortical root cells, resulting from the bacterial invasion, causes the root swellings known as nodules.

In the absence of nodule-producing bacteria, legumes possess no more capacity for fixing nitrogen than any other plant. It is therefore important that the proper strain or species of bacteria be present in the soil if the symbiotic process is to be effective and if the legume is to perform its full function in soil maintenance and improvement. Many soils do not contain the proper inoculating organisms and it is necessary to inoculate the seed artificially from fresh cultures of the particular strain of bacteria required. Seven groups of legumes have been recognized, each of which is susceptible to inoculation by specific bacteria. They are the alfalfa, red clover, vetch, bean, lupine groups, cowpea and soybean.

Legumes are not entirely dependent upon the symbiotic process for their nitrogen. In fact, even when inoculated, legumes obtain part of their ni-

EDITOR'S NOTE.—The author is chief, regional division of agronomy, Soil Conservation Service, Upper Darby, Pa.

trogen from the soil. They can grow in rich soil without forming nodules and fixing nitrogen. Under these circumstances, all the nitrogen required for growth is obtained from the soil. In general, it may be said that under average conditions, in a soil of moderate fertility, a well-noduled legume crop will take about two-thirds of its nitrogen from the air and one-third from the soil.

Estimating from available figures, a two-ton per acre yield of red clover, alfalfa, crimson clover, vetch, or cowpeas would collect in the top and roots approximately one hundred pounds of nitrogen from the atmosphere. Where the hay crop is harvested, however, an amount of nitrogen somewhat greater, in most cases, than that taken from the air by fixation is removed. The turning down of legume stubble cannot be depended on to increase greatly the nitrogen level of the soil. To add nitrogen to the soil it seems desirable to plow under a legume as a green manure some time during the rotation. Pieters, in his book on "Green Manuring," has quoted estimates of Whiting and Fred to show that if no more than 50 pounds of nitrogen per acre were fixed by the symbiotic process and 10 percent of the cultivated land in the United States were planted to a legume crop, 920,000 tons of nitrogen would be added to the soil every year. When you realize that the total nitrogen used in commercial fertilizers annually is only about 400,000 tons, the importance of the contribution of a wider use of legumes in soil conservation is at once apparent.

When it is fully realized what these microscopic bacteria that live in association with legumes can do, the legume will find even wider use in soil conservation work. Saving in fertilizer costs, stimulation of grasses, increasing the erosion-resistant character of vegetation, and providing a better feed for livestock are some of the results. The agronomists, of the Soil Conservation Service and of the State colleges can take pride in having enlisted these minute bacteria as an aid to the effectiveness of soil conservation practices.

PAID EMPLOYEES

Out of an appropriation provided by the State legislature, the Virginia Soil Conservation Committee employs a full-time technician to look after the purchase of machinery for soil conservation districts. It also uses on a full-time basis a soil analyst, and is one of the few State committees to maintain a part-time paid secretary.

HOW TO OBTAIN SOIL CONSERVATION MAGAZINE

Paid subscriptions are being accepted for *Soil Conservation Magazine* by the Superintendent of Documents, Government Printing Office, Washington, D. C.

With further free distribution impossible, many district boards of supervisors are purchasing the magazine at the regular rate of one dollar per year. In at least one instance a district board has entered a subscription on behalf of each cooperator. Business concerns and civic groups are beginning to buy gift subscriptions for clients and other farmers who will stand to benefit.

In many quarters *Soil Conservation Magazine* is looked upon as one of the essential tools of farm progress, along with machinery items and good seed. It tells what is going on in the districts, shares practical suggestions, explains new techniques, constitutes a meeting ground for the best thinking of authorities on various phases of soil and water conservation.

NOW THEY FIGHT FOR SOIL

There are at present in the Washington office of the Soil Conservation Service a total of 36 war veterans—35 of World War I and one, Captain George Dasher, of World War II. Headed by the Chief, they are—

Hugh H. Bennett

Benjamin H. Carr	Lewis A. Jones
Thomas B. Chambers	Frank Kimball
William O. Cousins	Walter C. Lowdermilk
Tom Dale	Howard E. Middleton
Harry C. Diener	Ethan A. Norton
Walter D. Ellison	John T. Olsen
John S. Fickling	Maurice J. Orler
Sydney D. Frissell	Oliver B. Perkett
Robert L. Geiger, Jr.	Gilbert B. Posey
Harry A. Gunning	William D. Potter
Robert B. Heenan	William C. Pryor
Carl M. Helgeson	Frederick G. Renner
Max M. Hoover	Robert M. Ross
Frank J. Hopkins	Guy R. Stewart
Cleveland W. Humble	C. Warren Thornthwaite
Eric A. Johnson	Russel E. Uhland
Anwel E. Jones	James V. Webb

World War II
George Dasher

REVIEWS

PLEASANT VALLEY. By Louis Bromfield. Harper and Brothers. 302 pp. illus. 2nd Ed. 1945.

Although this book—in reality a series of fascinating essays about the land by one who lives upon it and feels a moving kinship with it—is in no sense a technical work, it is of great moment to the professional soil conservationist. It is so because it brings closer the time when soil conservation will be commonly met with in our literature. And when that time has come, soil conservation will be in the lives of the people and have become part and parcel of our culture. The soil conservationist knows that then the most precious of all resources will be secure and our ultimate national welfare far more certain than it is now. Yet the book is not all about conservation of the soil. It is about Louis Bromfield, the Ohio farm he chose to come back to from abroad, the home he built there and how he cultivated the good earth to prove that husbandry is a matter of intelligence and science as much as it is hard work and tradition.

There is something comforting to us to know that an American who lived many years in Europe and Asia and who became a famous novelist and wealthy man by the fruits of his own hard labors at the lonely job of writing—that this man came home to find solace in a land where there is freedom and promise. He settled upon an eroded and worn out acreage badly injured by the kind of thoughtless farming that is all too common with us. And he made a house there and brought the land back to life. We need not say that he could do it because he was rich—hundreds of thousands of farmers in organized soil conservation districts throughout the United States are doing the very same sort of thing. And I think many of them would read Bromfield's chapters with a nod of the head and agreement that here too is a man who knows the soil and loves it, and all the things it produces—food to eat, trees and the cool woodlands they form, the quail in the fencerow, the horses and cattle, sheep and goats that thrive upon the land, and the people who live there. To the author these people are of primary interest and many chapters tell of the folks who once lived on the farm but are there no more and of others who still give it character and meaning. Nor is it right to say that Bromfield has just discovered agriculture. He wrote about this very country-

side in "The Farm," published in a siege of homesickness during his long sojourn of some 30 years in the Old World, and no one "without he was born and bred there" could have the feeling for country people, maple sugar making, wild flowers, honey bees, farm animals, and the very soil itself that is expressed in these pages.

It is not easy to review this book for it is not easy to translate the charm of masterful writing. Every one who has an interest in the land, however, should enjoy having the book where he can pick it up at odd moments to read snatches in it. He may often read longer than he intends. Well printed and nicely illustrated by Kate Lord's numerous line drawings, the book is neat and handy, in spite of its 300 pages. There are 17 chapters, and their titles characterize the book. Some of them are: The Return of the Native, Johnny Appleseed and Aunt Mattie, The Anson Place, The Plan, The Big House, On Being "Teched," The World Within the Earth, The Business of "Plowman's Folly," Of Green Hills and Valleys. The soil conservationist will be pleased to find compliments on the work he is doing and a chapter devoted to "Friends of the Land." Not too many men of affairs or men of letters have yet recognized his efforts, and the book is at once encouragement and challenge to the technician who has chosen to combine his professional talents with the efforts of farmers and ranchers so they may manage their land that it will continue to produce abundantly for them, their children, and their children's children.—Edward H. Graham.

PROFILE (Continued from page 32)

tomers will have been reduced and you will have lost another big block of your capital stock—the soil of this community."

Clark shows a slide of the Susquehanna Flats at the head of Chesapeake Bay. "The big ships used to come up here to load tobacco," he says, "Now look at it. Fifty thousand acres silted a foot deep between 1846 and 1938. In some places the silt is 18 feet deep. That's your soil down there, washed off the farms you depend upon to keep your community prosperous."

Thus speaks John Clark, soil conservationist. And everywhere he talks and shows his slides there's an upswing of public interest in a great cause. The editor of the Bel Air Aegis summed it up this way: "After seeing Mr. Clark's slides and hearing his personal comments, any alert farmer of business man realizes that the primary business of Harford Countians is to conserve and improve our land."

—HAL JENKINS

REFERENCE LIST



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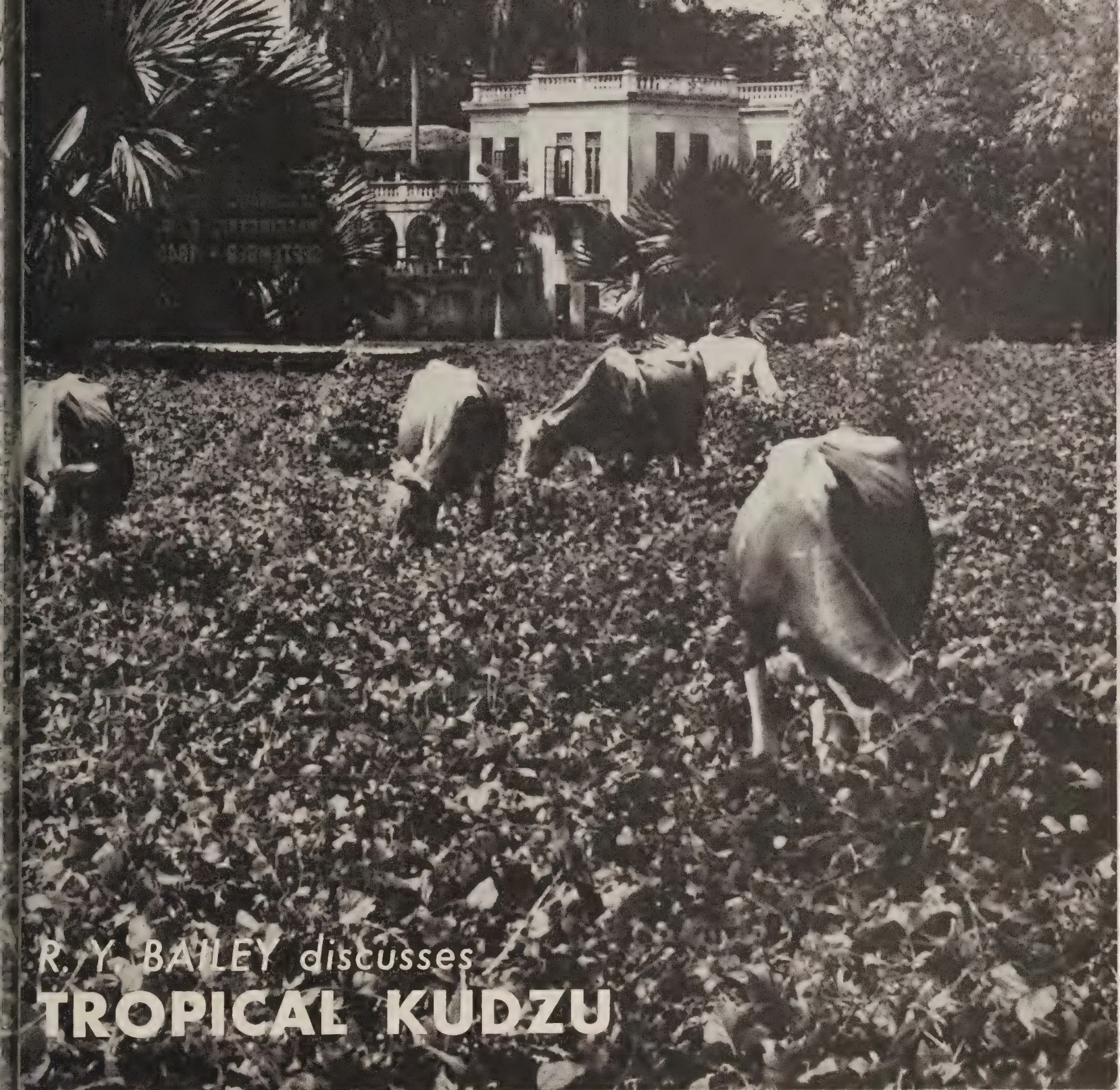
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¹ From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



R. Y. BAILEY discusses
TROPICAL KUDZU

SEPTEMBER 1945

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION

CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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Front Cover: This plot of tropical kudzu was the best source of green forage for cows at the Federal Experiment Station in Puerto Rico during the extended dry season early this year. Photograph taken by the Station.

SOIL CONSERVATION is issued monthly by SOIL CONSERVATION SERVICE of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of \$1.00 per year, domestic; \$1.50 per year, foreign. Postage stamps, will not be accepted in payment.



STATE FARMS CHANGE THEIR WAYS

By Gerald L. Seaman

Conservation farming is proving itself in Ohio on the 21,247 acres owned and operated by the State at 22 mental and penal institutions where crops valued at \$2,656,000 were produced in 1944.

John D. Bragg, chief agriculturist of the Ohio Welfare Department, credits conservation practices with putting the institutional farms on a sound food production basis at a time when he and his farm managers were about ready to give up trying to grow cultivated crops on various eroded fields.

Back in 1937, potatoes were produced on 20 of the farms to get enough to feed the State's wards. The job of supervising potato production at that many points, and the low yields, were discouraging. This was particularly true at the Apple Creek Institution for the Feeble Minded. Bragg and Cecil Edwards, farm manager, were all set to turn one potato field into pasture.

Two Soil Conservation Service men, D. W. Galehouse and W. S. Ufer, had been observing the Apple Creek institution's fields and were asked to take a hand. They made a soil survey. The field was terraced and laid out in contour strips.

NOTE.—The author is regional head of current information, Soil Conservation Service, Milwaukee, Wis.

Strip-cropped field on farm at Ohio State Hospital.

Since these conservation practices were adopted, that low-yielding, eroded potato field on the Apple Creek farm has been producing 300 bushels of potatoes, 75 bushels of corn, or 3 tons of hay per acre.

Results were so startling at Apple Creek that Bragg asked the Soil Conservation Service for technical assistance on the other 21 institutional farms. SCS men went to work, taking soil inventories at all the state farms and changing the cropping systems to fit the land.

Today potatoes are grown on 9 farms rather than 20 as in 1937. Yields have increased from an average of less than 100 bushels per acre to a good 250. The improvement was brought about simply by concentrating the potato production on the farms where surveys showed the soils best adapted to the crop. Only 9 sets of potato-growing equipment are needed now.

In Ohio each institution's land is now considered a component of one big farm rather than as a separate, independent unit. The 9 institutions growing potatoes ship them to the other 13. Bragg and Earl Tussing, Extension Service potato spe-

cialist, agree that the potato yields obtained in the past few years were not possible until production had been shifted to adapted soil managed the conservation way.

On the basis of 8 years' experience with conservation farming, Bragg says that the soil survey maps of the state farms have been of valuable assistance to him and his farm managers. He keeps one set in his office, takes another set with him on visits to the farms, and each farm manager has a set.

"Use of the maps," Bragg says, "has a valuable effect on the men in charge of the institution farms. They have become soil conscious and have really studied their land. I feel their success with the farms is due to this new interest which also keeps them interested in continuing their service.

"Much of the improvement in managing our soil is due to the cooperation received from the farm managers and superintendents in charge of the various institutions. Our farm managers have served an average of slightly more than 17 years each. They have been a part of the system long enough to adopt and practice good methods and to develop pride in the farms they manage.

"As a result of the soil surveys, we've already made adjustments on one-third of our land. We're including contour cultivation, strip cropping, diversion ditches, terraces, and longer rotations.

"We've changed the direction of cultivation on many fields where there isn't much slope but where

we had been plowing up and down. Even on fields which did not need contouring, we lengthened the rotations to include more sod."

Permanent pastures and woodland also show the influence of conservation practices. Several hundred acres of pasture on steep or badly eroded slopes have been converted to protected timber.

Outstanding examples of this shift are found at the Lebanon State Farm, at the Massillon and Athens State Hospitals, at the Boys' Industrial School at Lancaster, at the Apple Creek institution, and at the Mt. Vernon Sanitorium.

At the Lebanon farm, 70 acres of second-bottom land, previously too wet to cultivate, are now in crops because the hill land above is in pasture rather than cropland and more water is kept where it falls. On another farm, more cropland was made available by tile-draining a pasture to enlarge the truck crop acreage. On most of the farms some formerly cultivated land has been shifted to pasture.

Bragg finds that the net result of changes made so far is a smaller pasture acreage which, nevertheless, has an increased carrying capacity.

"We had to maintain our dairy production," he explains, "so we started using lime, fertilizer and manure, on the pastures and mowing to control weeds. Formerly, the pastures were able to support only our dairy herds. Now they carry 15 percent more dairy cattle and 400 head of feeder steers.



Ten-row potato sprayer operating on farm at Ohio State Hospital, Apple Creek, Wayne County.



Contour strips on farm of Boys' Industrial School, Lancaster, Fairfield County.

"Conservation farming also has made us more insistent on the application of lime and fertilizer to our cropland. When we used to miss a field once in a while, we didn't feel greatly concerned. But now when we miss treating a seeding in a set of strips it upsets everything."

Woodlands on the Ohio institution farms are auxiliary state forests and are being cropped under the supervision of the State Division of Forestry. All lumber is used on institution farms.

"To the extent that it keeps us out of the market for lumber," Bragg says, "it is contributing to the supply needed for war activities. In fact, the same thing might be said of all agricultural production at the state farms. Every pound, bushel or gallon we produce need not be taken from supplies necessary for our armed forces, our allies and our civilians."

Wildlife, as well as truck crops, feed crops and timber has a place in the conservation plans for institution farms. Small and irregular patches not lending themselves to other uses were planted to shrubs to produce food and cover for wildlife. Harvesting of the wildlife crop by hunters has been provided by a controlled game removal program developed in cooperation with the Ohio Division of Conservation and Natural resources.

Ohio Soil Conservation Service men are continuing their cooperation with Bragg in saving and improving the soil on the institutional farms. A concentrated program was carried on this spring when district conservationists visited each of the farms at the invitation of Bragg and his farm managers and the institution superintendents.

Typical of some of the reports the conserva-

tionists brought back is this one by H. T. Marshall of Coshocton who visited the State Sanitorium at Mt. Vernon:

"All conservation work is being carried forward in good shape. Mr. Cromwell, the farm manager, wants to do some drainage work soon. I promised our assistance."

H. B. Haskins, district conservationist at Hamilton, made the following comments after visiting the Lebanon State Farm:

"I feel that William Webb, farm manager, has done a fine job. The farm certainly looks a lot better than it did in the fall of 1938."

A visit to the Osborn State Farm at Huron by H. E. Hecker, district conservationist at Mt. Gilead, led to this report:

"They have done a marvelous job in developing this farm and are doing a good job following the conservation plan as set up. I was very much impressed by the green cover crops."

Hecker also visited the Ohio State Reformatory at Mansfield and observed: "It is very evident that the upland is now much more productive and that alfalfa now grows where red clover did not do well several years ago."

The Hawthornden State Hospital Farm at Macedonia, Ohio, was visited by A. R. Sanford, district conservationist at Cuyahoga Falls, who says:

"The conservation program here was planned 6 years ago. The present farm manager, George Gregory, was an employee when the layout work was done, and through his experiences in following the plan he is thoroughly sold on conservation farming. The bluegrass pasture is being managed

well, but better summer pasture is needed."

William S. Ufer, district conservationist at Wapakoneta and one of the two Soil Conservation Service men who helped start conservation farming on the institution farm 8 years ago, examined the Lima State Hospital farm this spring and comments:

"The control practices are excellent. The only place where there was evidence of erosion was on the small block of land along the highway. This field was in corn stubble this winter, and as Mr. White, the farm manager, pointed out, a cover crop winter grain would have eliminated this damage."

Regarding the soil conservation plan on the farm at the Institution for Feeble Minded near

Orient, Pearl Fogle, district conservationist at Lancaster, makes the following report:

"Among some of the practices installed are 110 acres of contour planting of row crops, 35 acres of strip cropping, and 200 acres of limed pasture of which 150 acres have been mowed to control weeds. Two tracts of woodland have been fenced from livestock and natural reproduction is now taking place in both. The cropping system has been changed from a 3- to a 4-year rotation of row crop, wheat, and 2 years of meadow. Since the conservation plan has been in effect, corn yields have increased from an average of 40 bushels per acre to 55. While there are still some active gullies, the situation is much improved since strip cropping was installed."

Twenty-year-old stand of white pine on farm at Ohio State Sanatorium, Mt. Vernon, Knox County.



1945 Ohio Conference

By William W. Reitz

The 1945 Conference on Conservation, Nutrition, and Human Health—the fourth in the series—was held on the campus of Ohio University, Athens, June 30, and July 1. This conference, which is becoming a national and international institution, was sponsored this year by Friends of the Land.

For the first time there was no connection with

the Ohio Conservation Laboratory for Teachers. Compensating for the camp atmosphere and "nearness to Nature" of previous meetings were the beauties of the campus and a greater degree of physical comfort. More than 150 persons registered. Most of them stayed overnight in dormi-

NOTE.—The author is head, educational relations section, regional office, Soil Conservation Service, Upper Darby, Pa.

tories and ate in the university's dining hall. Because of the appropriate location and the hearty cooperation of the University, it was agreed that future conferences should also be held in Athens.

Dean W. S. Gamertsfelder made the welcoming address in the absence of President John C. Baker, describing the gathering as a meeting of two pioneers: Friends of the Land, a leader in conservation education, and Ohio University, a forerunner in general education—the first institution of higher learning west of the Appalachian Mountains. He pointed out the need for conservation in Southeastern Ohio, and stated that the university recog-



Dr. W. E. Krauss.

nizes the conservation problems of this area and is trying to do something about them.

Dr. John Sitterly, associate professor of rural economics and sociology, Ohio State University, discussed "How Southeastern Ohio is Adjusting Her Land Use." One hundred years ago this part of Ohio was more thickly settled than now. The land was settled early and its resources exploited. Drainage was good and the soils were easier to work than the heavier soils farther west. The early settlers were not familiar with the use of the lime and commercial fertilizers, and if they had been, the difficulties of transportation would have restricted their use. Changing from subsistence farming to a money economy had a marked effect on the land. Forests disappeared. Soil fertility quickly lowered, and erosion became severe. Many



J. H. Sitterly.

aggressive farmers moved westward. Today the effects of soil-mining, bad land use, and poor farm management are everywhere evident.

State and local leaders are making concerted efforts to adjust the land to its natural uses and to introduce better farm practices. Only two-thirds of the land is classified as suitable for farming. It is proposed to put the remainder in forest, and to make farm forestry and wildlife management an important factor on individual farms. Farmers are encouraged to shift to those farm crops which are best suited to the nature of the land. Soil and water conservation practices gradually are being introduced. The organization of conservancy districts in the larger watersheds may aid considerably.

The Reverend Henry Retzek, pastor of St. Alexius Church, West Union, Minn., talked about "The Church in Rural Reconstruction." Retzek was born in Chicago and served as a chaplain in World War I. At the end of that conflict he requested his bishop to send him where he might have and enjoy "peace, peace, peace." After several appointments, he finally became the pastor of the small rural parish at West Union.

Many a churchman would have been content to confine his efforts to the spiritual needs of his flock, and to enjoy the peace which he says is found only in the country and which cannot be

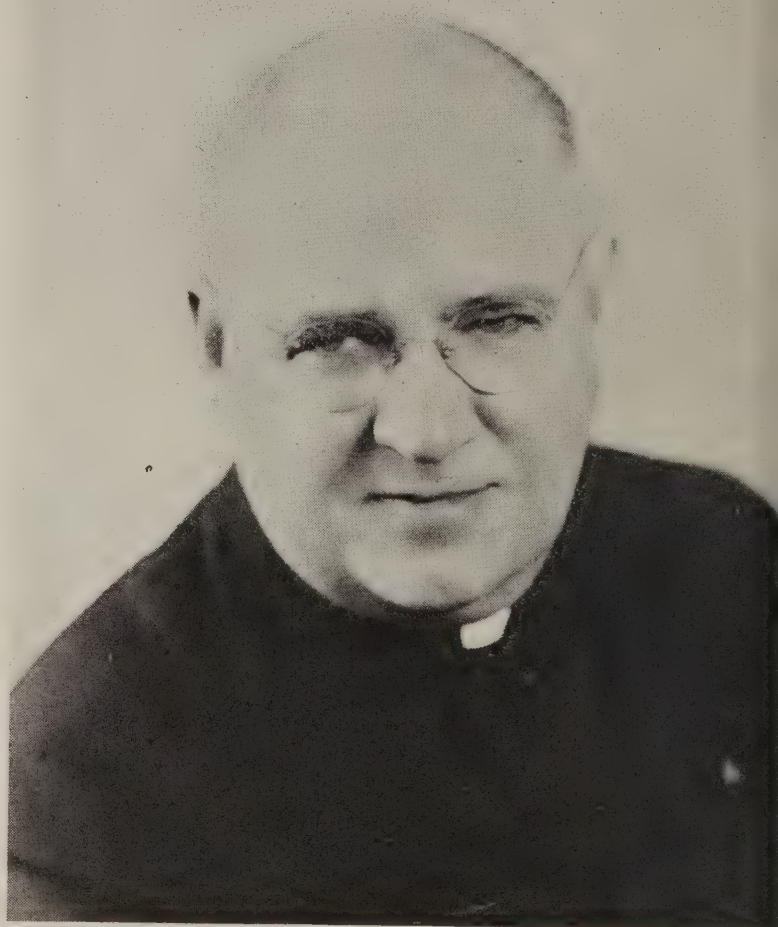
bought with money. Not so, Father Retzek. He threw his energies into the material welfare of his parishioners. At first he helped in harvesting their crops. Then he delved into the causes of low crop yields and the quality of the crops produced, particularly their nutritive value. He found that they were low in needed minerals and the vitamins. This led him to believe that the soils themselves were deficient. In his search for assistance Father Retzek appealed to a State experiment station, and offered to cooperate through personal research. His novel suggestion was not warmly welcomed. It was intimated that a pastor's place was in the pulpit.

Father Retzek, however, was not deterred. He felt a responsibility for the situation at his door. He read everything he could lay hands on that dealt with soils, fertilizers, food, nutrition, and farming methods. He decided that the soil is fundamental to physical well-being yet he found the soils science of that day in grand confusion. Of the 226 courses offered by a State College of Agriculture whose catalog he examined, only 9, or four percent, dealt even remotely with the soil.

Father Retzek felt that a clergyman is in a strategic position—the right kind can do as much as a county agent to provide effective leadership to farmers. He believed that anyone who faces a congregation weekly should in time influence greatly the rural trend. Yet, he asks, why does not the church do more about farmers' problems?

In addition to teaching and preaching, Father Retzek writes a column on soil depletion and its remedies for a weekly newspaper. But he gets his best results from what he calls his "subtle inducement method." "Tell the farmer that his land is poor and he will resent it; perhaps he will kick you off. Show him slowly and convincingly and he will realize it for himself." So he gets the farmer to perform simple experiments. When he knows that a piece of land needs lime, he gets the farmer to apply an appropriate amount of lime to a portion of the field. After the farmer sees the difference between 8-inch alfalfa and 24-inch alfalfa, no further argument is necessary. He uses the same tactics in regard to the need for nitrogen, phosphorus, potash, and organic matter.

Father Retzek has been working along this line with the farmers of his parish for 14 years. During this time he has been preaching the importance of high-protein foods. He tells his people that nitrogen is a factor in the production of protein, and that lime assists in the production of nitrogen. He conducts nitrogen tests, by the plant tissue method, on many varieties and strains of corn,



Father Retzek.

under many production conditions. To interest the farmer, he has him shake the test tube and read the results of the indicator from the color chart. By this method he has gotten the farmers to select better seed and use better methods of production. The result is that the corn now grown in his parish has a protein content from 6 to 10 percent higher than formerly. Father Retzek states that the more religion a man has, the better farmer he will be.

Bryce C. Browning, secretary, Muskingum Conservancy District, New Philadelphia, Ohio, spoke on "Protection of a Watershed."

In the spring of 1913, almost the entire State of Ohio was lashed by heavy rains. Floods damaged the whole of the Ohio River basin. The destruction of life and property in the Miami and Muskingum valleys was terrific. Following this disaster, the State legislature passed an act providing for the organization of conservancy districts. Shortly afterward the Miami Conservancy District came into being. This latter project involved the construction of 5 dry dams surrounding Dayton. These dams were fitted with conduits which accommodate the normal flow of the stream channel but automatically impound surplus water during severe storms.

The Muskingum Conservancy District was organized in 1934, though extensive surveys, plan-

ning, and other preliminary work were carried on during the preceding 10 years. This district differs from that of Miami in that it is a completely planned watershed, including flood control, water conservation, and recreation. The total cost runs to about \$45,000,000, provided from PWA funds, State appropriations, and assessments for local benefits. Instead of dry dams, the dams in the Muskingum District are kept filled to a certain height. By closing gates above this level, the capacity is increased and the water is held back until the gates are opened. The permanent lakes cover 16,000 acres. A recent survey of the recreational facilities alone gave an appraisal value of \$807,000,000.

Dr. Walter C. Lowdermilk, assistant chief, Soil Conservation Service, spoke on "Soil Erosion and Civilization." Through lantern slides he showed the extent of erosion in Mesopotamia, Palestine, and Trans-Jordan, and discussed its effects on ancient and subsequent civilizations. By similar means he presented the erosion and other agricultural problems confronting China today. He has been advising the Chinese government in its attempts to solve some of these problems.

Lowdermilk holds that a continued high state of civilization depends upon the proper use of the land and the maintenance of soil fertility. He points out that civilization rested upon three agricultural efficiencies: crop efficiency, land efficiency, and farmer efficiency. In contrasting the United States with China, he notes that in China the first two efficiencies were high while the third was low. On the other hand, in the United States, farmer efficiency is high while the other two are quite low. He warns that if this country is to survive it must have all three efficiencies.

The speaker reminded the Athens Conference that the population of the world has multiplied four times during the last 300 years. This was because of the occupation of new frontiers and industrialization. There are no more geographical frontiers, but there is a frontier under our feet. We can open it through better land practices. Forty percent of the farmers in the United States today are subsistence farmers. If the present rate of increase in population is to be maintained, the production on these farms must be raised. The average sized farm, in this country, under a high state of fertility should support eight families—seven besides the farmer's own household.

Louis Bromfield, author, farmer, and vice president of Friends of the Land, dealt with the topic, "Saving This Land of Ours." Nobody, declared Bromfield, can determine what this war is cost-

ing in terms of money. It must be measured in the forest cut down, the soil destroyed, the petroleum and metals consumed, the health of the people, the lives of the boys who fought. The people of Germany today are not looking for money, they are looking for food. Food is the thing that now counts most.

The strength of a nation depends upon the health of its people. This in turn depends upon food. The quality of the food is determined by the fertility of the soil. Evidence of these facts has been brought out through Selective Service during the present war. In Alabama, 7 men out of every 10 were rejected because of physical defects. In Colorado, 7 out of 10 were in excellent condition and were accepted. Bromfield added, that on his farm in Pleasant Valley, Ohio, crop diseases and insect pests are being defeated by balancing the mineral matter in the soil.

Dr. Martha Koehne, nutritionist, State Department of Health, Columbus, Ohio, told of the changing food habits of our people. The United States has a wider variety of food habits than any other country. They are influenced by religion, nationality, local customs, individual tastes. Other controlling factors are the abundance or scarcity of certain edibles, because of emergency, isolation or poverty.

"The Adequacy of Our National Food Supply" was discussed by Dr. William E. Krauss, chief of the Dairy Department, Ohio Agricultural Experiment Station, Wooster. He is also a member of the subcommittee on food supply, National Research Council.

Krauss pointed out that food is a powerful weapon, both in war and in peace. He ascribed a large waste of valuable nutrients by their separation and discard. For example, there is as much energy in skim milk as in butterfat.

Many of the animal organs, such as glands, kidneys, brain, blood and sweetbreads, have more food value than "red" meat. Many of the cheaper cuts are more nutritious than choice steaks. Other types of animal products, such as milk, eggs, fowl, fish, lamb, and pork, are often richer in valuable minerals than beefsteak.

During the present emergency there has been a seeming shortage of certain foods, though it is doubtful whether these were insufficient at any time to meet the actual needs. A shortage is a deficiency in relation to demand. During the war, we drank more milk and fruit juices, and ate more meat and many other foods than ever before. On the other hand, we consumed less butter and other fats. Through victory gardens, civilians produced

almost half of the supply of vegetables. The armed forces were the greatest victory gardeners in the world. Not only were large forces deployed to care for and harvest crops in this country, but in conquered countries they produced huge quantities of vegetables.

There will be approximately five percent less food in 1945 than in 1944, declared the speaker. The supply of beef should be better soon. The outlook for pork is not so good. The egg situation will get worse. In spite of this, the food supply will be ample in the United States. The enrichment of bread and cereals is a great contribution to human welfare. We should aim at greater consumption of milk, cereals, and vegetables. An attempt will be made to increase milk production and to use all the solids. More people could be fed if they ate the vegetable matter directly, rather than first feeding it to animals. But much vegetable matter is not suitable for human food. In the future, much of the nutritive material may be extracted from such vegetation and made into synthetic foods. The time may come when there will be severe competition between natural foods and synthetic foods. Drastic changes in dietary patterns will change production patterns, and therefore, conservation patterns.

Dr. C. R. Orton, Dean of the College of Agriculture and Director of Extension, University of West Virginia, gave a very enlightening talk on "Soil in Relation to Health."

"Quoting from the Book of Genesis, Dr. Orton pointed out that the sequence of creation was significantly as follows: sunlight (light), air (firmament and sky), water, soil (dry land), plants, animals, man. Sunlight, air, water, and soil are primary resources. The last two are largely within the province of man. Plants and animals form a second class of resources, which constitutes a great intermediary for the conversion of the mineral and other natural elements into food for man. Man was directed to have dominion over these resources. Given the power to reason, he has the responsibility for acting wisely.

In discussing the mineral elements in soils and plants that are essential to man, he presented a table from the U.S.D.A. Yearbook for 1938 that showed that, with few exceptions, these minerals were found in approximately the same proportion in soils, plants, and man. From these facts, Orton deduced that any deficiency of minerals in the soil will affect the health of man.

"The Potential Role Which Nutrition Can Play in the Maintenance of National Health" was elaborated upon by N. Phillip Norman, M.D. Dr. Nor-

man is a pioneer clinical nutritionist engaged in active practice. For a long time he has used his efforts to interest physicians in the prevention of illness through the prescription of balanced nutritional diets. He is also co-author, with James Rorty, of a book widely acclaimed for its comprehensive treatment of the nutrition problem.

Dr. Norman pointed out that we have spent many millions of dollars for agricultural improvement without appreciably decreasing physical defects or improving the general health of the people. To support his contention, he, too, alluded to the rejection rate of Selective Service.

Dr. Norman sees the problem as much more than one of medical care. The approach, he contends, should be direct. It should aim at the nutrition in our everyday diet, and the source of the elements which make for nutrition, the soil. More study, he feels, should be given to the relation between food and chronic diseases. Cancer and heart disease accounted for 57 percent of deaths in 1941. Less than 62 cents per death was spent on the control of these diseases, and less than 6 cents per death on research regarding them.

Russell Lord, editor of *The Land*, reported briefly on his recent trip to the British Isles, dwelling particularly on the food situation there during the war and now. By plowing up every possible square foot of soil, Britishers were able to raise their home-production of food from one-third to two-thirds of their total consumption. He found that through rationing and meal planning by restaurants and hotels, not only was the health of the people maintained but food habits bettered.

Jonathan Forman, M.D., editor of *The Ohio State Medical Journal* and a practicing physician, summarized the Conference—"Current Thinking in Conservation, Nutrition and Health"—tracing the pattern of the program from its start with soil and water, its progress through food, its culmination in consideration of nutrition and human health.

SUPERVISORS ON STATE COMMITTEE

The Georgia legislature has amended the State Soil Conservation Districts Law so as to include two soil conservation district supervisors as members of the State Soil Conservation Committee. T. B. Thornton, chairman of the board of supervisors of the Broad River Soil Conservation District, and John C. Wise, secretary of the board of supervisors of the Lower Chattahoochee Soil Conservation District, have been appointed by Governor Ellis Arnall.

DETROIT LOOKS TO THE LAND

Industrial, agricultural and business interests of Michigan are working together these days on a post-war prosperity program, in which the development of a more efficient agriculture is given the position of first and primary importance. The Detroit Board of Commerce inaugurated the project because its members have become convinced that their ultimate economic salvation depends on a prosperous agriculture.

More than 300 persons called together by the association, representing approximately 70 organizations, pledged themselves to the support of a program of which the theme is "Prosperity From the Ground Up," a slogan reflecting the fact that all wealth springs from the soil.

Detroit, the world's greatest manufacturing center, will depend on the farm to a steadily increasing extent in the years to come for the raw materials of industry, it was felt.

Keynote was struck by Roger M. Kyes, President of a manufacturing company, who declared:

"It is possible for us to lower the cost of production of raw materials by putting our land in shape, by recreating the forests, by cooperating with the American farmer so that he can have proper marketing outlets, proper transportation, proper legislation, and all the various things that are necessary for him to do his job of giving you the raw materials you require at a low cost of production if economically we are going to be on a sound basis."

"Sixty-five percent of the raw materials used in American manufacture come from the land," declared the speaker, who also told his hearers that "Detroit will die on the vine unless we go back and pour plenty of water on the roots."

Indicative of its interest, the Detroit Board of Commerce has adopted the "Prosperity From the Ground Up" program as a major activity, and is pushing it aggressively. H. Lynn Pierson, Chairman of the Board's Agricultural Survey Committee, has named advisory and executive groups to counsel and direct operations.

Actively identified with the project are leading figures in the industrial and business life of Detroit, as well as city and county officials, educators and others. Among those who have evinced keen interest are Dean E. L. Anthony, of the Department of Agriculture, Michigan State College. Milton P. Adams, of the Michigan Stream Control Commission, P. J. Hoffmaster, Director of the State Conservation Commission, Dean S. T. Dana, School of Forestry and Conservation, University

of Michigan, Charles Figy, Commissioner of Agriculture, C. L. Brody, Michigan State Farm Bureau, Roswell G. Carr, Farm Security Administration, E. C. Sackrider, Soil Conservation Service, and a number of country agricultural agents, Soil Conservation officials, and representatives of the National Council of State Garden Clubs, The State Farm Bureau, the Michigan State legislature, 4-H Clubs, National Farmers' Guild, the Michigan State Grange and other groups.

AS SEEN FROM THE AIR

The dramatic performance of soil and water on the stage that is Earth is noted and vividly reported in a letter from Navy Lieutenant William L. Southworth:

"I have just seen the most sensational demonstration of *real* soil conservation I have ever witnessed, about 10 or 15 minutes south of Omaha. I am enroute home to Sioux City, Ia., by plane and am writing this note in flight for fear I'll neglect telling you about it later.

"There must have been one hell of a rain either last night or this morning in this corner of Nebraska because field after field was chewed raw by new gullies—many of them were still choked with water or debris. Even pastures on what looked like very moderate slopes were slashed wide open, bleeding soil at a terrific rate. There wasn't a sign of a contour, a terrace, or check dam, as far as I could see in the very limited visibility.

"But all at once we began flying over what obviously is a demonstration area or soil conservation district. About 4 out of every 5 farms were—or looked like they were—fully protected. It was the most amazing contrast. Terraces were still chockfull of water. Contoured slopes looked like lakes tipped at a 45 degree angle on the hillside. Smaller lakes strung out as snake-like beads in gullies that had been check-dammed. And then all at once we were out of the area—and there went the soil again, off to the Gulf a mile a minute.

"I guess it was that abrupt and almost terrifying contrast that made me want to write someone about what I'd seen. You probably know the area well that I'm writing about and I just thought you'd like to know how it looked after a real test. It looked almost too good to be true—and if you ever had any doubts as to whether you and your gang are *really* helping to win the war—forget them once and for all. Those contoured and protected slopes will produce FOOD this year. I can't see how all those new gullies can produce *anything*."



Technician Carter (right) points out to James Archie the silt deposited in oats stubble and lespedeza when terrace above was overtopped by heavy rain.



There's food aplenty in the Chisolm pantry. Tom and his mother know this canned corn on the cob will taste mighty good next winter.

NEGROES MAKE GOOD

By A. F. RUFF

In the summer of 1943 I went with Thomas E. Carter, Soil Conservation Service Negro technician in the Catawba Soil Conservation District, to visit the farm of James Archie in the black jack

NOTE.—The author is assistant state conservationist, Soil Conservation Service, Columbia, S. C.

James Archie cultivates his cotton in a field that is contour-tilled, terraced and strip-cropped.

lands of Chester County, S. C. Archie's eroded farm was then being planned for complete soil conservation.

A few days ago I spent another day with Carter. Again, we called on James Archie. I actually did not know the place. Not until I had walked over the farm and met the owner did I remember having been there before. Archie's friendly greeting and ready pronouncement of my name stirred my memory.





The Chisolms sold \$1,018 worth of milk in 1944. Cotton yield increased to 12 bales from 12 acres last year. Here young Tom waits for father and sister Lizzie to load milk.



Joe Powell, Catawba Soil Conservation District, is proud of the lespedeza and oats he grew this year—the oats for grain, the lespedeza for hay.

IL CONSERVATIONISTS

"James, where have I seen you before?" I asked. "Why, Mr. Ruff," he replied, "don't you remember year before last you took me and Lloyd Boyd to see your place?"

Archie was right. He, Boyd, and Carter had come with me two years before to see soil conservation practices on my farm near Rock Hill, S. C. I had bought this farm in 1934 when it was in a low state of cultivation and immediately began to apply first strip cropping, then all the known soil

conservation practices. (In 1933 two tenants on this farm with 4 mules made 7 bales of cotton and practically no feed. Since 1938 two tenants consistently have averaged a bale or more cotton per acre and surplus feed for sale.)

At the time of the trip, the group had observed sericea and kudzu meadow strips, contour tillage, terraces, and other proved conservation measures.

Increased income from higher yields and diversified crops results in a better home for the James Archie family.



They were particularly interested in seeing the land which I had taken out of cultivation and planted to trees or kudzu, because this land was better adapted to permanent vegetation than to row crops like cotton or corn.

Of course I was delighted to see how Archie had remade a worn-out cotton farm. Archie is still primarily a cotton farmer but his soil is naturally adapted to small grain and grasses. For that reason, Carter and Archie had planned primarily for cotton and dairying in developing a soil conservation program. Modern terraces have been constructed. Five acres of formerly unproductive pasture have been improved. Kudzu has been planted on two of these acres to provide supplemental summer grazing.

Archie's first cotton crop, following a conservation rotation of lespedeza after oats, showed a material increase in yields. With the increase in hay crops because of the better methods of farming, Archie now plans to increase the number of his dairy cows from four to ten, and declares, "With the help I have received from the Soil Conservation Service and the Catawba Soil Conservation District, I can now see a bright future and a good farm for my children."

What I saw on Archie's farm, and on the farms of other Negro cooperators that day, proved what I already believed—that Negroes make excellent soil conservation farmers when they receive the necessary technical assistance and guidance. They are making good use of all the lands on their farms, growing the crops to which each field is best adapted. They are increasing their yields. They are diversifying farming operations so that cotton no longer is their only source of income. And, of course, they are reaping the benefits of increased income in better living standards.

Let me tell you about some of the other Negro Soil conservationists whom I met that day while with Soil Conservationist Carter.

Jim Chisolm told me that "the Soil Conservation Service and hard work together have paid for my \$3,000 FSA farm."

Chisolm's soil conservation farm plan was made in 1940 when his income was only \$600 per year. Practically all that income came from 8 bales of cotton. But because much of his soil was not suited for cotton production and there was a market for milk, Chisolm's farm was planned primarily for milk production. In 1945, this Negro farmer told me that he had grown 12 bales of cotton—a bale to the acre. In addition to the increased yield of cotton because of better land use, he produced and sold \$1,018 worth of milk. Where he formerly had

"two scrub cows," which supplied milk only for his family, he now has 13 milkers including some purebred animals. Chisolm has several daughters and he said that selling milk is easier for them than growing cotton. Because of the increase in grain production he was able to grow and sell \$200 worth of chickens and turkeys last winter.

Charlie Davie, who lives on Route A, Chester, S. C., has done remarkably well, too. Davie's farm is sloping and when he made a farm plan with the Soil Conservation Service technician, his land was badly eroded. Much of it had to be planted to kudzu and sericea lespedeza. The remaining land has been terraced and put into strip rotation. Davie said that his cotton yield has increased from 200 pounds to 300 pounds, and that he makes as much cotton now on less land as he did before the eroded areas were taken out of cotton—and with less effort. Nine cows instead of three help him to sell his hay through the milk route for \$720.

"I did not have enough hay to run me before I got in the program, even though I had only three cows," Davie explained. "My farm was getting smaller and smaller each year. Now I have more producing acres than I ever had before and it looks like I can stay on my farm." Davie is fully aware of the benefits of manure for increasing yields, and emphasizes that fact.

Dotson Barber of Catawba is an enthusiastic cooperator with his soil conservation district, and is high in praise for Technician Carter.

"I depend on Carter," Barber said. "He has helped me to get started the soil conservation way. I am almost able to stand alone now, but I still need his help. He has shown me how to farm more crops on fewer acres and to keep my land good at the same time. I have doubled my cotton yields and I got \$300 extra this year from cutting undesirable trees for pulp and firewood. My woods are not only in better condition but during my slack time I got \$300 spending money."

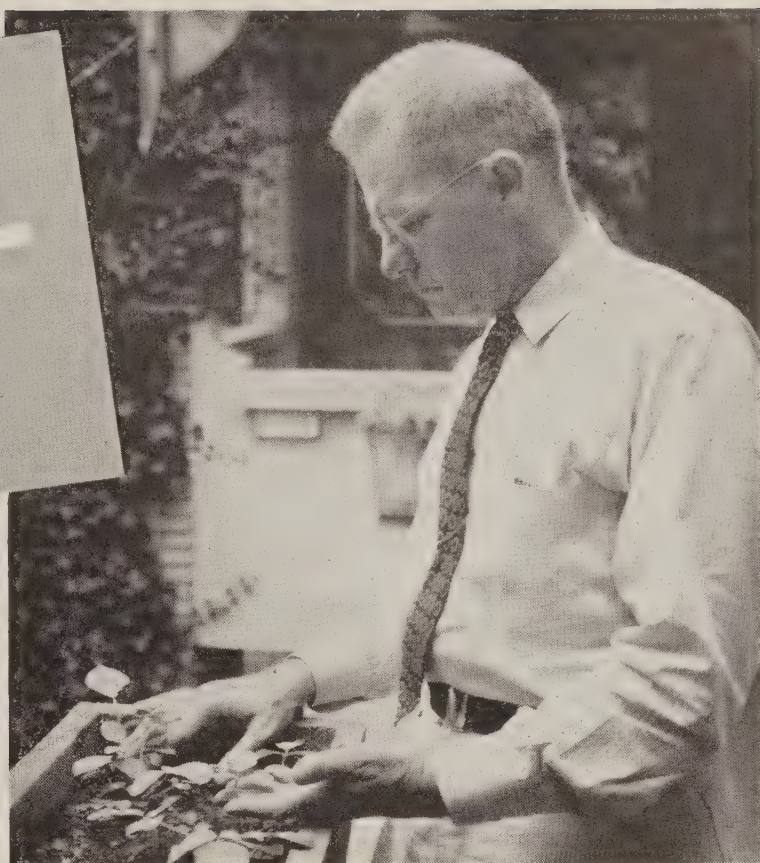
George Grey, who lives on Route 1, out of Chester, S. C., owns 361 acres, the largest farm we visited. He has done a good job of terracing and establishing all other practices that make a complete soil conservation program. He has planted four acres of kudzu, which is controlling erosion, improving the soil and providing both hay and grazing for Grey's livestock.

If you know the seriousness of the soil erosion problem in the South—and it is the Number One problem of the South—and need inspiration, I would suggest that you visit the farms of really good Negro cooperators.

(Continued on page 70)

TROPICAL KUDZU

By R. Y. Bailey



Dick Bailey examines seedlings of tropical kudzu growing in flower box at his South Carolina home.



Pueraria phaseoloides Benth is a vigorous stoloniferous legume which shows promise in Puerto Rico as a pasture and cover crop and in controlling erosion. It fruits heavily from December to February. Flowers are purplish white, pods black, leaves resemble those of soybean. Stolons readily root at nodes and to some extent at internodes. (Photo: Federal Experiment Station in Puerto Rico.)

Country boys when far away from familiar scenes and faces often come upon friends in the vegetation along the way. Most of us who are experienced travelers find ourselves, when traveling beyond our normal range, looking from train windows to see what grows alongside the tracks. Familiar species of trees, crops, or even weeds somehow make us feel a little closer home.

Our boys who have gone from the Soil Conservation Service to far places of the earth today are upholding the best traditions of country boys away from home. Their letters glow with descriptions of the agriculture of distant places. They chatter enthusiastically of the rediscovery of the familiar cotton and sweet potato and other plants.

Southern boys from this Service met an old acquaintance in the kudzu growing in tropical jungles on the islands of the Pacific, in China, and in other lands. Many of them have taken the time and trouble to describe the conditions under which they found kudzu growing. Their letters have given us useful information about the distribution of the wonder plant. They also have shown that these men who went from the Service still are conservationists at heart and are looking forward to the day when they shall return to their old jobs.

Lt. Col. William W. Stevens, assistant chief, regional soil conservation surveys division, wrote

NOTE.—The author is Chief, Regional Agronomy Division, Soil Conservation Service, Spartanburg, S. C.

his wife, Emily, to tell us that because of a dense growth of kudzu extending 20 miles he had found great difficulty in getting through a jungle in an advance across one of the Philippine Islands. Steve probably wasn't very glad to see this 20-mile strip of kudzu then, but doubtless will have interesting details to add when he returns.

My nephew, Capt. Charles H. Bailey, formerly work unit conservationist, Dothan, Ala., reported finding kudzu at several places in New Guinea and in the Philippines. In January he noted, "I found kudzu practically everywhere I went on the Coastal Plain of New Guinea, even finding it in the deep shaded portions of the jungle at times. Most of the grassland had kudzu growing *down in the grass*. Strangely, there seemed little inclination for it to climb the grass stems.

"I saw some old vines running along the ground in Kunai grass and they were often as big as $\frac{3}{4}$ of an inch in diameter. I dug up one of the crowns that was about 3 inches in diameter and close to 2 feet long. Even with the rapid growth in the tropics, I would guess it must have been all of 20 years old. Some of the runners on this one plant must have been 150 feet long. The best growth of kudzu I saw was about 8 miles west of Buna. The approximate location is longitude 148° 21' east, latitude 8° 43' south.

"None of the natives were able to tell me of any use they had for kudzu and none of them knew where it came from."

In April, Charles finally got clearance to mail samples of two kinds of kudzu seed collected on one of the Philippine Islands, along with clover seed and crotalaria seed collected on New Guinea. He arranged to get the seeds fumigated and they arrived at Spartanburg in good condition, ready for trial under entirely new environment.

As described in his letter, one kudzu species has flat, fuzzy seed pods similar to the old type of kudzu (*Pueraria thunbergiana*) grown here in the Southeast. The other was described as having small, rounded, smooth, black pods similar to miniature cowpeas.

The species having the smooth black pods like cowpeas appears to be similar to what is being called tropical kudzu in Puerto Rico. This species has been identified as *Pueraria phaseoloides* (javanica) Benth, according to Henry A. Telford, associate soil conservationist, Soil Conservation Service, and Norman F. Childers, assistant director, Federal Experiment Station, Office of Experiment Stations, Puerto Rico, in an article prepared for "Agriculture in the Americas."



Long runners enable tropical kudzu to thrive beneath trees in spite of the latter's competition for water and nutrients. This picture was taken 6 months after seeding. (Photo: Federal Experiment Station in Puerto Rico.)

The ordinary kind of kudzu that is being grown in the southeastern states was tried by the Soil Conservation Service in Puerto Rico, but did not grow well there. In contrast with the poor growth of ordinary kudzu the tropical kudzu made excellent growth. Complete stands have been established from seed in six months.

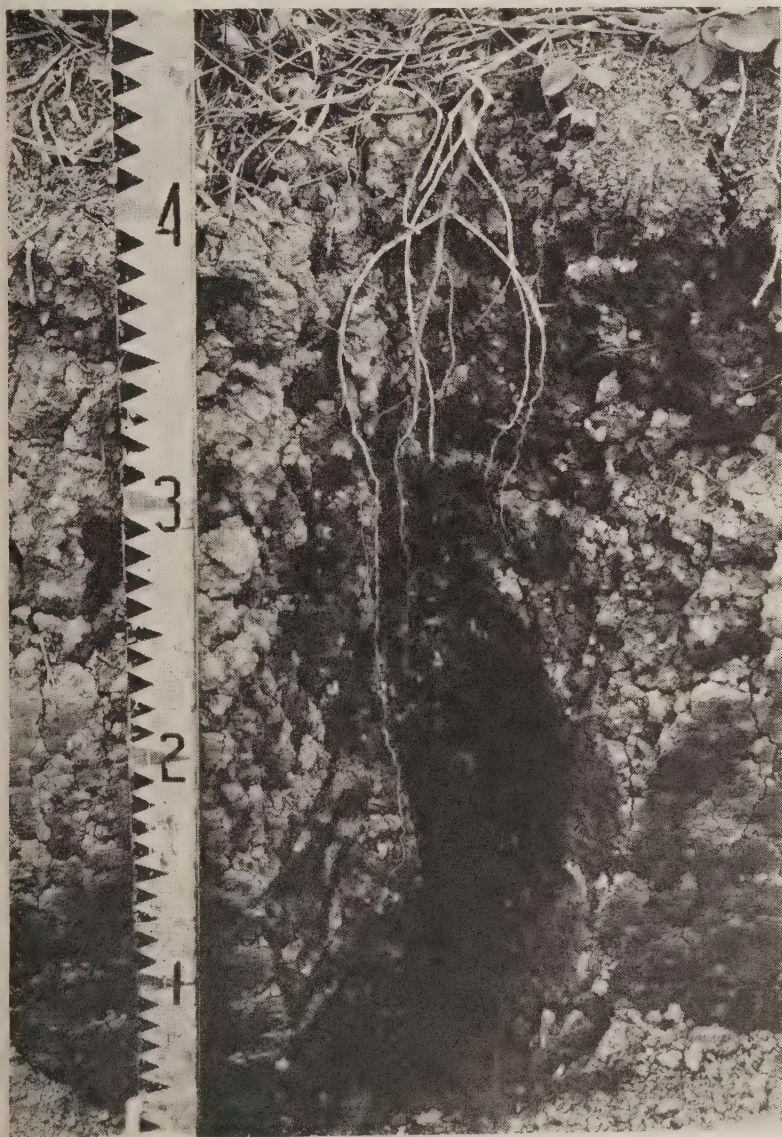
Tropical kudzu has proved to be drought-resistant and tolerant of both sunshine and shade in Puerto Rico, where it has been grown since 1940. It is palatable and is eaten readily by livestock. It is reported to be filling a definite place in Puerto Rico as an erosion-resistant ground cover that competes well with weeds and most undergrowth. It is reported to have been used extensively in Java, Malay, and neighboring countries as a ground cover in young rubber and cinchona plantations while they were becoming established. The Firestone Plantations Company, Liberia, West Africa, reports several thousand acres of it in their young rubber plantations.

One of the most interesting characteristics of tropical kudzu is its prolific seeding habits. U. S. Allison, director for the Service in the Caribbean area, is rather enthusiastic about the possibilities of this strain of kudzu producing sufficient seed to make harvesting by machinery a feasible practice.

Allison was in the regional office when the two samples of kudzu seed from the Philippines were received and it was his opinion that neither of these was the same as the species being grown in Puerto Rico. The seeds of the Philippines species were inclined toward a somewhat rectangular shape rather than a true bean shape.

Thus it appears that instead of but one tropical strain of kudzu the Soil Conservation Service may now have at least three separate strains. Out of the three may come something useful for areas where ordinary kudzu (*Pueraria thunbergiana*) is not adapted because of climatic or other factors.

The two samples of seed received from the Philippines were divided into three parts. One sample was sent to the regional nursery at Thorsby, Ala., a second to the nursery at Brooksville, Fla., and a third to Puerto Rico where the Philippine species may be compared with the tropical species (*Pueraria phaseoloides*) now being grown so successfully there.



Roots of 2-year tropical kudzu plant penetrate heavy Catalina clay soil more than 4½ feet. This explains why kudzu withstands drought periods better than most leguminous cover crops. (Photo: Federal Experiment Station in Puerto Rico.)

A few seeds of each species were planted in a porch box on the second floor of my apartment. The seedlings that are up will be tended carefully during the summer and will be exposed to the winter temperatures without covering or other protection. If any of them survives the winter under such adverse conditions, the use of these strains will not necessarily be confined to tropical climes.

Samples sent to the two nurseries and to Puerto Rico will give us an opportunity to study the performance of these new kinds of kudzu in central Alabama where the temperature sometimes goes as low as 10 degrees above zero for short periods, at Brooksville, Fla., where citrus fruits are grown, and in Puerto Rico where tropical climate prevails.

Why all the fuss about tropical kudzu?

Tropical strains that would grow well under the climatic conditions prevailing in several of the countries to the south of us might be very valuable. For example, Puerto Rico is finding that the tropical strain has great promise there as an erosion control and forage plant, whereas, *Pueraria thunbergiana* failed to grow satisfactorily there. In the Florida peninsula there is a vast area of sandy soils where an adapted, drought-resistant legume would have great value. *Pueraria thunbergiana* does not appear to meet this need.

The interest shown by people in tropical countries in Russell Lord's article in *Reader's Digest* indicated that in most of those countries an adapted strain of kudzu would be of great value. Of the more than 2,000 letters referred to this office from those who read Lord's article, several hundred were from tropical countries. It was not possible to read those letters without becoming conscious of the need for any perennial legume that may prove to be adapted under their soil and climatic conditions. It may be that tropical strains will provide at least a partial answer.

Even in the Southeast where the old kind of kudzu grows well, the excellent seed-producing habit of some tropical kudzu species holds out interesting possibilities.

The present status of tropical kudzu is that we have it under observation under a number of widely varying conditions, but that we know little about it. The preparation of this article was for the purpose of giving out the little information we have, but is in no sense intended to set any of us up as experts on tropical kudzu.

Information we have received through letters from Service personnel suggests the desirability

(Continued on page 71)

SUBSURFACE TILLAGE WINS FOR SIBBERNSEN

By A. E. McCLYMONDS



Participating at presentation of achievement award: Left to right—A. T. Pearson; County Agent Sam Lingo; Mrs. Sibbersen; C. Edmund Anderson, work unit conservationist; Mr. Sibbersen; Paul Tanner; Roy T. Kirkpatrick, district conservationist; Walter White, secretary of the agricultural committee of the Omaha Chamber of Commerce. Pearson and Tanner are with the company making the awards.

The award for superior agricultural achievement which is granted each week by one of the great oil companies goes to only 52 of the Nation's 6 million farmers in the course of a year. Winning it is a triumph for the individual far outstripping the \$100 war bond, the pennant, the lapel pin and the framed scroll.

When A. H. Sibbersen of Bennington, Neb., won the honor recently. It was a triumph for conservation farming. He practiced good land use and soil and water conservation as a means of getting production to the highest level and keeping it there.

An outstanding farmer, Sibbersen takes advantage of all improvements in crop varieties, livestock production methods, and management. He is ever keen to new things. He will tell you that conservation farming makes the big difference between his own production and that of other good farmers who haven't yet adopted the modern methods.

"Improvement in crop strains and new crops won't help much unless you have fertile soil and water," Sibbersen remarks.

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Neb.

A resident in the Papio Soil Conservation District, the first in Nebraska, he was one of its early cooperators. Actually, development of his present farm conservation plan got under way in 1934, when the Balir CCC camp built 5 dams in three big gullies. It really began to take form when the camp was transferred to the Soil Conservation Service, and Sibbersen and the Service technicians decided what needed to be done. Then came cooperation with the Papio district, organized in the spring of 1938.

Sibbersen began farming in 1926, and has 800 acres in the steeply rolling eastern Nebraska loess hills area. Ordinarily he feeds out about 250 steers, 2,200 lambs and 500 pigs each year. About two-thirds of his land is in cultivation.

Today he is more firmly sold on conservation farming than ever. That is because he has achieved increased production with less work, and has also brought about improvement in his land. Those are good enough reasons at any time, but now, with food production requirements at peak, they carry special significance.

Before he started conservation farming, Sibbersen had been troubled by serious soil washing

and consequent damage to crops and land. Two big gullies were growing rapidly and threatened to ruin a large part of his farm.

His conservation plan embodies subsurface tillage and contour planting on terraced fields, development of a soil-conserving crop rotation that contemplates getting alfalfa and brome grass over the whole farm at regular intervals, a tame-grass pasture rotation system, and grassed waterways to dispose of water safely.

That is, the plan was put into effect after he had rearranged his fields so that the various parts of the farm could be put to their best use according to the capabilities of the land. Fences were put on the contour so that the fields would fit the new



Even the garden is contour-farmed.

system of farming. Smaller gullies were made into grassed waterways. Land retired from cultivation was seeded to grass. A windbreak was planted to protect buildings and lots.

"Farming is a lot more interesting now," Sibbernson says. "After one gets accustomed to conservation farming and sees what it accomplishes, he can't help figuring out ways to improve the farm further by trying out new practices, new crops, new field arrangements and new wrinkles in management. I never cease to be amazed at the way the land will respond. It is a long-time program, and how much more fun it is to build than to tear down!"

One of the changes is in the way he handles livestock. Sibbernson used to depend on drylot feeding. Now he pastures his stock and feeds them grain at the same time. His brome grass-alfalfa pasture system is developed largely around the ponds in the old gullies, a combination which he claims will result in good pasture from early spring



Some of the Sibbernson cattle near one of the farm's five ponds. The waterway, where once was a large gully, can be seen extending diagonally back from the pond. In the background is part of a pasture, divided by a temporary fence, which is rotated around the pond as part of the long-time crop rotation. The whole farm is covered by pastures rotated around ponds.

until late fall. Grain is available in self-feeders out in the pasture at all times, and very little drylot feeding is done.

Handling the livestock in this way, Sibbernson points out, gets the weight gains with a lot less grain and much less work than drylot feeding. Besides, he contends, the stock are out on clean ground where they can move around and their general health is better. Of much importance right now, too, is the fact that the brome grass and alfalfa meet most protein requirements while drylot feeders face shortages in protein concentrates.

"This method," he says, "also builds up the farm. The fertility is applied directly to the land, with no leaching away. We pasture 5 steers per acre, and the fertility from the corn crops is returned to the land. Only what the steers carry away is lost, and that amounts to little. See how



All of the farm's crop land is terraced, farmed on the contour, and subsurface tilled. Note the litter on the surface.

it works? The pastures are rotated, so that the entire farm benefits."

Before starting the practice of subsurface tillage, 5 years ago, Sibbernson contour-listed his croplands.

"There are so many advantages to subsurface tillage," he says. "One can cover so much ground this way, and do a better job of preparing the soil than by plowing. It's less expensive, too. And it's hard for one who has not seen it to believe the amount of water sub-surface-tilled land will soak up. Contour-listing and terraces held the soil, all right, but they couldn't hold nearly so much water. We've had some favorable years, but one of these days we'll be really glad for every drop of water impounded."

Representatives of the Skelly Oil Company found out what he meant after the presentation of the award, when they were shown over the farm. They remarked at the slight evidence of runoff and erosion on the subsurface-tilled land, even though there had been a heavy rain—part of a protracted wet season—only a few days previously. Except for one small plowed strip which is part of a demonstration he is conducting in cooperation with the Soil Conservation Service, Sibbernson plants everything on the contour, on terraced land that has been subsurface tilled.

"We plant everything on subsurface-tilled land and on the contour—feed crops, soybeans, potatoes, even the garden. The first operation is done right after harvest. In wet seasons, it may have to be repeated, to control weeds. In spring each field is subsurface-tilled again, then packed before seeding. There just isn't any washing of soil now. I know where the soil is likely to pile up and I keep close watch, but there are no signs of erosion. And that means, of course, that no crops are washed out."

Sibbernson calls his farm a 7-man place. He normally depends on himself, two sons and four hired men. But with the boys gone from the farm, five actually are carrying on. And yet—"We get the work done on time." That is one of his evaluations of the worth of conservation farming.

"All in all," Sibbernson concludes, "I've been on this farm 19 years and production has doubled in that time. Most of the increase has come during the 10 years I have been conservation farming. And we have only just started."

Now his achievement has received recognition. The Skelly award was presented at a breakfast at the Sibbernson farm home, the program being broadcast nationally. The \$100 war bond was di-

vided at Sibbernson's request among the men who work with him, in recognition of their part in the farm's achievement—"They did most of the work."

Behind it all, though, is an even greater satisfaction. He was a pilot in World War I. His two sons are serving in World War II, one as a Marine fighter pilot operating from an airplane carrier, the other serving in the Merchant Marine. He's backing up those boys—and other dads' boys, too,—to the limit.

And now, since the boys have been home on furloughs, Sibbernson knows that his work will go on. Both boys plan to return to the farm immediately after the War, one to devote his energies to carrying on the conservation and crop program his dad has begun, and the other to specialize in the livestock end.

Why Banks Want Soil Conservation

By T. S. BUIE

For 18 months a certain bank's soil conservation advertisements had been coming across our desk. Timely, informative and usually illustrated with photographs, they urged farmers to work with the Catawba Soil Conservation District.

"Make the Best Use of Every Acre on Your Farm," the bank was urging.

Or, "This Land May Be Down But It Is Not Out." The picture with this ad showed a badly-gullied hillside.

Or, "Strip Cropping Saves Your Soil and Increases Yields."

Of course we had a good idea why the Rock Hill, S. C., National Bank, like other banking institutions and associations, are supporting the new style of arming. But we wanted to get the story first hand. With E. P. Classcock, Rock Hill dairyman and supervisor of the Catawba Soil Conservation District, we called on John A. Black, president of the bank, who is a native of York County.

"Tell us what you told me the other day about your soil conservation ads," prompted Glasscock.

"We began our advertising program about four years ago soon after we opened the bank," Black explained. "About 18 months ago we started soil

EDITOR'S NOTE.—The author is regional conservator, Soil Conservation Service, Spartanburg, S. C.



Banker Black is putting soil conservation practices on his own land. Here, with Dan S. Hollis (left), a neighbor, he is examining a good growth of crimson clover and oats. The bank president has arranged with Hollis to combine the clover seed crop.

conservation ads. And the only ads which have ever been mentioned to me by a newspaper reader not connected with the bank have been our ads about soil conservation. You see, I'm out of the bank quite a bit—on the street; out in the country, at the community stores, or on some one's farm. Many people tell me they've seen our ads about kudzu, or winter cover crops, or good land use. But no one outside the bank has ever told me he read one of our regular advertisements."

President Black went on to explain that one-third of his bank's advertising budget is spent in support of soil conservation work. Three ads are published each week. Two are standard, formal bank advertisements. The third, appearing each Friday, carries a message about soil conservation.

M. B. Brissie, district conservationist, and J. T. Brannon, work unit conservationist, assigned by the Soil Conservation Service to Catawba Soil Conservation District, help Black prepare the copy. Typical of these messages is this one:

"Every Plan Does Not Result in Success. But every success is the result of a plan.

"Have you planned the wise use of your land? Call on your Soil Conservation District Super-

visors for help in working out a complete plan for your farm."

The picture used in this display showed a farmer and a Soil Conservation Service technician on the land discussing a farm conservation plan.

"Mr. Brissie and Mr. Brannon have done much of the work in connection with the advertisements, and they deserve a lot of credit for them," the banker said.

Although Black calls on the Soil Conservation Service technicians for help in preparing his advertising copy and refers farmers to the soil conservation district for assistance, he has a good working knowledge of soil conservation himself. He proved that later in the day, on his own farmland and on the farms of others.

"Why are you supporting soil conservation like this?" we asked.

Black reached for his hat. "Come on," he said, "I'll show you."

With District Supervisor Glasscock and Assistant State Conservationist A. F. Ruff of Columbia, formerly manager of the Soil Conservation Service demonstration project on Fishing Creek watershed, we drove from Rock Hill to Chester.

At one place the banker pointed to a steep, eroded hillside.

"That's the kind of land we had in mind when we wrote our ad about land that may be down but not out," Black explained. "We have more than 50,000 acres of once fertile land in York County that is now on the way out. It has become too poor for row crops, and has been abandoned. Farmers have clipped all the coupons. They have lost production and income from 50,000 acres. Merchants and business men have lost trade—or banking business—to that extent. But this land can be returned to production with kudzu or sericea, and that's why we wrote an ad about it."

At John Getty's farm we stopped briefly to watch sloping, cultivated land being terraced as part of the establishment of a complete soil conservation program. Heavy equipment is owned by Tarver Township, and Glasscock, who also is township commissioner, makes the equipment and an operator available to farmers at \$3 an hour for construction of terraces. Last year the equipment built 400,000 feet of terraces, and the township received about \$4,000 additional revenue.

Then we drove by a farm that was green with small grain. "A few years ago," Black said, "this farm was considered one of the worst in this community. Now it's one of the best—and getting better all the time. The new owner worked hard,

and the soil conservation district helped out in planning and establishing conservation practices."

The next stop was at the Dan S. Hollis farm. Hollis took time out from a job of clearing a small area of brush and undesirable trees, as the first step in developing an improved pasture, to show us over his 274-acre farm.

"When I bought the farm seven or eight years ago, this land was abandoned," Hollis said, pointing to a 20-acre field of barley. "Last year I harvested 50 bushels of barley per acre. We built up productiveness with small grain and lespedeza. I believe we turned under one crop of cowpeas, and we spread barnyard manure on the worst eroded areas."

"That's what I mean," Black said. "Farmer, community, county and other towns are getting the benefit of 20 producing acres here where a few years ago nothing at all was returned."

Hollis showed us critical slopes not suitable for cultivation which he is seeding to sericea lespedeza, a perennial legume excellent for grazing and for hay production. He soon will have 14 acres in sericea.

Hay and grain produced on the farm are marketed primarily through 14 dairy cattle and 34 beef cattle.

Black took us to one of his farms where he is developing improved pastures on bottomlands. It lies along Fishing Creek. He wouldn't say how much grazing these pastures had given his registered Angus cattle during the past year, because "it's so much no one would believe it, anyway."

The Rock Hill banker was particularly proud of an upland field of crimson clover and oats. Although this field would have provided a great amount of grazing, Black was saving the clover for seed production.

On the way back to Rock Hill, Black enlarged on his answer to the question, "Why are you supporting soil conservation?"

"When a man sees his farm improving, he just naturally takes more interest in his farm, and more interest in his equipment, his buildings, and his home," he explained. "His farm does begin to improve from the day he starts putting a soil conservation program on it. Then, as he gets higher yields per acre and greater income, he's in a better position to try new crops, to diversify, and to improve his living standard."

Then he reverted to the banker's viewpoint—"Soil conservation certainly increases a farmer's ability to meet his obligations. It is good business for him—and for us too."

NEGRO SOIL CONSERVATIONISTS

(Continued from page 62)

Lloyd Boyd is one of them. When his sons return from the Army, they will find some mighty good land—land much better than it once was.

The white Dutch clover in Boyd's pasture is affording excellent grazing for his six cows. He has improved several acres of his pasture and he has a very good stand of Dallis grass and white Dutch clover. The day we visited his farm he had just finished planting cotton, the acreage of which he has reduced by about two-thirds. He was preparing with his small tractor a few acres of very rich bottomland to be seeded to pearl millet, which will supplement his permanent pasture.

As we prepared to drive away from Boyd's home, he called to Carter, "Don't forget to get \$30 worth of pearl millet seed and drop it by here when you are next passing. If you haven't got the money handy, let Mr. Ruff pay for it." And that I gladly agreed to do.



Lloyd Boyd looks to the day when he can retire and turn his farm over to his sons who are now in the army. The land will be much more productive, because of soil conservation practices.

HOW TO GET SOIL CONSERVATION

Subscriptions to this magazine—\$1 per year—should be sent to the Superintendent of Documents, Government Printing Office, Washington, D.C.

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REVIEWS

PUBLIC SPEAKING FOR TECHNICAL MEN.

By S. Marion Tucker. McGraw-Hill. 1939.

This book is meant for any individual who has an occasion to speak in public. It takes the view that any speaker's main business is to hold the attention of his audience. The common trait of all of us, "nervousness," is given early treatment, as no speaker can control his audience until he can control himself. Through an imaginary character, Mr. Morrison, the reader follows all the preparation for a talk, even to the checking of stage, hall, lights and other mechanical items which are so often important in the successful delivery of a speech.

The book's method is novel and interesting. Imaginary characters are created who in themselves illustrate the various good and bad points of public speaking. For example, analysis brings out the weak voice of Mr. Lane, the mumbling of Mr. Brewster, the poor English of Mr. Armstrong, the incoherence of Mr. Reynolds, the annoying mannerisms of Mr. Hollister, the misuse of materials and charts by Mr. Connelly, the misuse of the blackboard and exhibits by Mr. Fulton, and the fine speech at the luncheon by Mr. Morrison, who shows how preparation and technique can be used to advantage. "Public Speaking for Technical Men," thus breaks away for the formal textbook style to resemble an informal discussion between friends. This makes the volume somewhat more wordy than it might otherwise be, but it also makes for easier reading by the average person who wishes to improve his understanding of public speaking principles.

The authors point out that the technical man has the advantage of an interesting subject. He also has the advantage of an audience that is more or less familiar with, and interested in the material he wishes to present.

Every member of the Soil Conservation Service occasionally has an opportunity to talk on some phase of soil and moisture conservation. Many a technician can do an effective job of putting across to his audience, be they farmers, bankers, school teachers, service club members, or garden club members, the ideas he wishes them to have and to understand. Many group meetings owe their success to the ability of the technician to arouse interest and to keep that interest alive. The tech-

nician who can "handle" himself in front of a group, and can put his thoughts in such a manner that he gets a favorable reception and desired action, is the type of technician who is often most successful in getting conservation on the land.

Grover F. Brown.

TROPICAL KUDZU

(Continued from page 65)

of making a rather definite effort after these men return to us at the end of the war to get each of them to write a report of promising plants that were observed, particularly on the Pacific Islands. Many of these islands were little known before the war. It may be that information gleaned from our people will suggest post-war plant exploration which might yield rich returns.

Plants introduced into this country as a result of observations made by our men engaged in the destructive business of war may have real value in our future agriculture. Thus, Southern farm boys fighting in distant lands, in looking for old friends, may have found new and useful plants that will help save the soils and improve the agriculture of their native Southland.

FIRST BOW

Recently issued is Volume 1, Number 1, of The Journal of the Soil Conservation Service of New South Wales. Leading article is by the Hon. W. J. McKell, M.L.A., Premier and Colonial Treasurer, who writes: "The battle against man-made erosion will be long and continuous, for the menace of erosion is ever present; but the decks have been cleared for action and now the action has begun. It is a fight which can be won; it is one which we cannot afford to lose."

WHO? WHERE? WHAT?

J. B. Ketcham, county agent, Warsaw, N. Y., has an excellent idea, well worth adoption elsewhere. In a recent letter to all cooperators in Wyoming County—on one sheet—he briefly and clearly tabulated the duties of the local offices of the Extension Service, the Agricultural Adjustment Agency, and the Soil Conservation Service. He listed locations, names of those in charge, and telephone numbers. Then he noted the kind of information, counsel and help which each of the offices is prepared to supply. He left no room for confusion among farmers as to lines of responsibility and services, demonstrated that there is no overlapping of functions, made it easier for farmers to do business.

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¹ From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

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CHIEF, SOIL CONSERVATION SERVICE

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Front Cover: Little Miss Georgia Millender, daughter of District Conservationist Alfred F. Millender, examines an ear of hybrid corn produced in a contour cultivated field on farm of George Van Syckle, a district cooperator in Harrison County, W. Va. Photographer: Ann Ware.

SOIL CONSERVATION is issued monthly by SOIL CONSERVATION SERVICE of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of \$1.00 per year, domestic; \$1.50 per year, foreign. Postage stamps, will not be accepted in payment.

Cartography at War... By Louis A. Woodward

THE Cartographic Division of the Soil Conservation Service was a key link in the chain which produced the maps and charts required by the armed forces for prosecution of the war. It occupied this position primarily because of its experience in producing similar materials for the Soil Conservation Service for more than 10 years.

Some of the major items were topographic maps, planimetric maps, aeronautical charts, photo-maps, aerial photographs, intelligence photographs, radar charts, bomb target charts, instrument trainer charts, fire plan charts, landing charts, nautical charts, long range navigation ("loran") charts, and various other materials. Some of the work performed still has a high security classification and can not be described at this time. The following are some of the more than 15 War and Navy organizations for whom work was performed:

War Department:

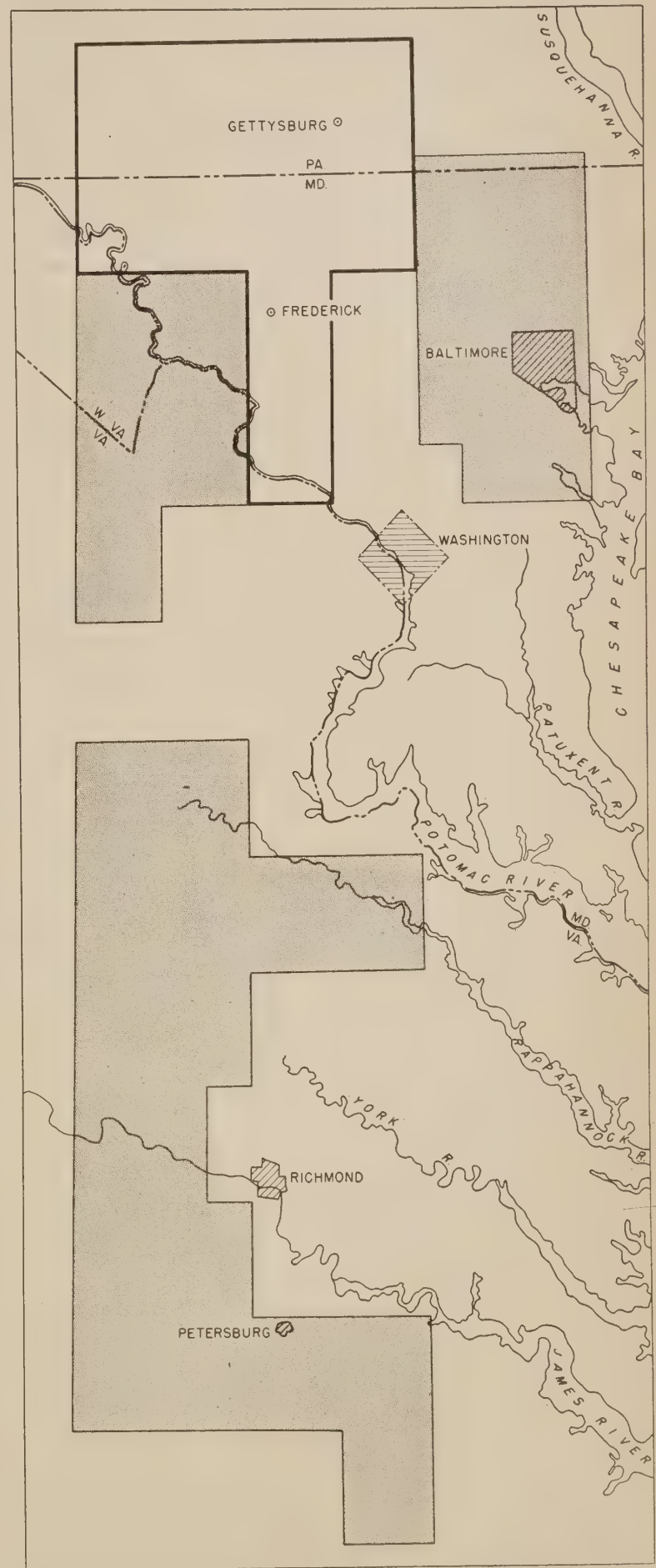
- Corps of Engineers
- Army Map Service
- Army Air Forces, Aeronautical Chart Service
- Army Air Forces, Film Library

Navy Department:

- Hydrographic Office
- Visual Design Research Laboratory
- Bureau of Aeronautics
- Bureau of Yards and Docks

In the years preceding World War II, American military experts carefully developed their plans for M-Day, a hypothetical date on which the production facilities of this country might be mobilized for national defense, according to preconceived plan. Actually M-Day for our Cartographic Division was in September 1941, about three months before Pearl Harbor. On this date a request was made by the Corps of Engineers of the War Department to produce 109 topographic maps at a scale of 1:20,000 with a 20-foot contour interval of an area in Virginia, Maryland, Pennsylvania, and West Virginia. (See Corps of Engineers map.)

This work was part of the National Defense Program and covered one of the areas considered as a likely spot of invasion. It is difficult today to



SOIL CONSERVATION SERVICE, WASHINGTON, D. C., 1945

TOPOGRAPHIC MAPS FOR THE CORPS OF ENGINEERS

NOTE.—The author is cartographic engineer, Soil Conservation Service, Beltsville, Md.

look back and justify our invasion fears of 1941. However, at that time an invasion was considered a real possibility, and the area assigned to the Soil Conservation Service for producing topographic maps was, according to military experts, a part of one of the places on the East Coast most suitable for an invasion. The area between that assigned to the Soil Conservation Service and the coast was assigned to two other federal mapping organizations.

The specifications required the use of new aerial photographs, and therefore, one of the first steps was to make an aerial survey of the entire area. Since the majority of our peacetime mapping work involved the production of planimetric maps, only a relatively few pieces of stereo-photogrammetric equipment capable of plotting topography had been procured. On a topographic mapping project, the area compiled per man day with stereo-photogrammetric equipment is only a fraction of the area that can be mapped by planimetry alone during the same time. Equipment limitations made it necessary to devise new methods in order to comply with delivery requirements, as new equipment was not available in less than 2½ years. The method developed was one which utilized existing stereo-photogrammetric equipment and field surveying methods. The magnitude of this project is indicated by the approximately 6,200 lineal miles of level lines, together with approximately 1,000 miles of traverse. The 6,200 miles of level lines is almost equal to the distance from Washington, D. C., to Tokyo, Japan, and the 1,000 miles of traverse lines approximate the distance from Washington to Omaha. Specifications issued by the Corps of Engineers, in general, stated that 90 percent of all clearly identifiable features should be located on the map within 1/50-inch of their true geographic position, and that 90 percent of all contours should be within one-half of the contour interval. In order to meet these requirements with the equipment available, approximately 1,250 control points were identified and located by surveys and approximately 950,000 spot elevations determined. The manuscript maps were compiled at a scale of 1:12,000, color separation drawings made at 1:20,000, and the final maps reproduced at a scale of 1:31,680. At a later date the reproduction of the maps compiled by the Forest Service (shown by heavy outline on the Corps of Engineers Map) was assigned to the Soil Conservation Service. Reproduction was required in four colors, i.e., culture in black, drainage in blue, woodland in green, and topography in brown. *A total of 520,000 printed maps was delivered to the War Depart-*

ment and as each map was in four colors, a total of 2,080,000 impressions was made. Approximately 30 tons of paper were used in printing the maps on this project.

In May of 1942 the topographic mapping program was getting well under way when a request was received from the Army Map Service to produce maps of several camp and maneuver areas. By this time Selective Service was inducting thousands of men each month and camps were being constructed in which to quarter and train these men. Maps of these areas were required immediately. The urgency of this work necessitated the use of all available personnel and equipment. With the assistance of the Regional Cartographic Divisions planimetric maps showing all cultural and drainage features, at scales ranging from 1:62,500 to 1:125,000, were produced of approximately 13,000 square miles in 60 days. In some cases topography was required to be taken from an old topographic map, and adjusted to the new planimetric map. Most of this project was produced by working on a three-shift basis with each shift working some overtime.

Long before the topographic mapping program was completed for the Corps of Engineers, the Aeronautical Chart Service of the Army Air Forces requested the Cartographic Division to compile 140 aeronautical charts covering about one-third of the United States. (See Army Air Forces map.) These charts were for defense and training. The size of this program, considering the commitments already made to the Corps of Engineers for topographic mapping, was far beyond the available facilities in Washington, and, therefore, assistance was requested from the Regional Cartographic Divisions. A substantial portion of this program was completed in regional offices. In addition to compiling the charts, this program called for the delivery of color separation reproduction negatives. The method used on this program was to compile and draft all of the required information on one or occasionally two boards where the information to be shown was very complex, in order to avoid registration difficulties. The required number of copy negatives were made of each board, and color separation was effected by lithography.

By this time the defensive stage of the war was rapidly drawing to a close and plans were under way to take the initiative. This, of course, required various types of maps and charts of foreign areas. The United States first took offensive action in North Africa and, as might be expected, this was the first theater of war in which we com-



TOPOGRAPHIC MAPS FOR THE ARMY MAP SERVICE

piled and reproduced maps. Naturally, our work was completed long before ground operations started. Although we did not have any one large specific project in North Africa, a great many miscellaneous maps, bomb target charts, etc., were produced in this area. *Another type of early offensive operation on which our facilities were utilized, was in preparing some of the material used to plan and execute various commando raids. As an example we produced some of the material used on the famous Dieppe raid.* When the materials were being produced we did not know exactly what they would be used for, or when they would be used; however, the personnel who produced these materials were not greatly surprised to read of the commando raid in the newspapers at a later date. Only the personnel who actually produced the materials had knowledge of the area covered by the maps.

One of the most interesting and also one of the most difficult projects was the preparation of topographic maps covering approximately 34,000 square miles in Northern Italy for the Army Map Service. (See Army Map Service Map.) These maps were at a scale of 1:50,000 with a 50-foot contour interval. Again the Regional Cartographic Divisions played a very important part. This program was handled largely on an assembly-line basis with a portion of the work first being performed in Washington where the necessary large equipment was available, forwarded to the regions for drafting, and then returned to Washington

for final editing and preparation of reproduction negatives. Numerous difficulties were encountered on this project in meeting the required delivery schedule. Available Italian maps, aerial photographs, and other intelligence information were used in producing these maps. Quite frequently aerial photographs of various areas in Italy would be received within a very few days after the photographs were made. On more than one occasion, personnel were detailed to Washington from the regions in order to assure compliance with War Department delivery requirements. Assistance was also obtained from the U. S. Forest Service and the Bureau of Agricultural Economics.

On the Italian project the Army Map Service requested the delivery of photographic color proofs on all completed sheets. A reasonably satisfactory method of preparing color photographic proofs by "projection" was in use by the Army Map Service at that time; however, the contrast between the various colors by the method then in use was far from satisfactory. The use of color proofs when colors are not clear and distinct increases editing time and also increases the possibility of errors in the final maps. Errors in maps can cause the loss of many lives and mean success or failure of a military venture. *A "contact" color photographic method of proving maps before reproduction was developed by the Division that is superior to all other known methods of color photographic proving. This method is in general use today.*

As the work in Italy was about completed, another assignment was made by the Army Map Service which included the preparation of topographic maps covering portions of the Islands of Java and Madura. These maps were probably the most complicated of all. Eleven colors were required to show adequately all of the required information. Again a portion of the work was assigned to the Regional Offices and the U. S. Forest Service.

With completion of the Java-Madura project our work for the Army Map Service was finished. By agreement between Aeronautical Chart Service and Army Map Service, the facilities of the Soil Conservation Service available to the War Department were to be utilized entirely by the Army Air Forces. Our first assignment was to prepare charts covering various groups of Islands in the West and Southwest Pacific. (See Army Air Forces map.) This was closely followed by an assignment to compile aeronautical charts of all of the Japanese Islands from below Formosa north through Sakhalin Island. *It is interesting to remember the argument between many of the per-*



CHARTS FOR THE ARMY AIR FORCES

SOIL CONSERVATION SERVICE, WASHINGTON, D.C., 1945

sonnel to see who would get to work on the Tokyo sheet. Before this sheet was completed, a substantial portion of the employees of the Cartographic Division had something to do with it. Some of the photographs taken on the Doolittle raid, together with others taken at a later date, were used in preparing these charts.

After the Japanese charts were completed, various assignments were received which included areas in Korea, China, French-Indo-China, and Malaya.

Two types of charts were prepared for the Army Air Forces, one generally known as "aeronautical charts," and the other "flight charts." The aeronautical charts are generally at a scale of 1:250,000, 1:500,000, or 1:1,000,000 and cover most of the world. The flight charts are generally used for flights between large bases and are at a scale of 1:1,000,000. Several of the aeronautical and flight charts have been compiled many times, as better source material became available. The total area covered by aeronautical and flight charts, including water areas and recompilations due to new information being secured, was in excess of 11,000,000 square miles.

There have been a great many relatively small jobs completed which are not included in the major projects listed above. These jobs ranged in cost from a few hundred dollars up to 20 to 25 thousand dollars each. Many of these jobs were more difficult than the larger ones mentioned above where definite delivery schedules were established. Some were of an experimental or development nature while others were purely emergency work and required a continuous 24 hour day, 7-day week effort until completed. On one particularly rush job we had overnight air messenger service between Washington and London.

One of our development projects was to produce a chart which would have the same features appearing in the same form as the electronic image on a radar scope. This involved considerable research, including flights in a B-24 bomber to observe the radar scope in flight operation, etc. A combination of our development, together with the ideas of the 8th and 20th Air Forces, was finally adopted. This type of chart is entirely different from the usual maps and charts as many of the ground features do not appear on the radar

(Continued on page 82)

Grassland Farming in Vermont

By L. Stanford Altpeter



Grassland farming proves successful in Vermont.

SHORTLY after the White River Soil Conservation District was established, the board of supervisors and the planning staff began to realize that some particularly knotty problems would have to be solved on many farms if erosion were to be halted. Croplands on our farms can be a nightmare to the soil conservationist trying to plan row crops. He must deal with variable soil types, extreme and uneven gradients, seepage areas, ledges, boulders.

On the Montpelier soil group, for example, ledges outcrop on a north-south line at approximately a 45-degree angle, with uneven pockets of soil between outcrops. North-South plowing and cultivation is imperative on such lands, regardless of the degree or direction of slope. Montpelier soils are found across the entire northern third of the district.

In other areas district land is of an undulating nature, due to erosional and glacial processes over the ages. Hard pans scattered unevenly force ground water to the surface in hit or miss fashion. Soil type changes occur so frequently that soil maps are unlikely to present the soil condition in sufficient detail.

The most satisfactory solution to these problems seemed to be for farmers to turn to grassland farming. There was need, however, to inquire into local experience to provide moral support for such a program.

One of the early requests for assistance received by the district came from Joseph and Claude Bellefeuille of Tunbridge, Vt. Father and son had de-



Timothy was held back by the damp, cold spring, but tall oatgrass kept right on growing on the Joseph Paquette farm, Bethel, Vt.

veloped a herd with an excellent record for production. Production was on the increase. In 1940 they had attained a herd average of about 375 pounds of butterfat per cow. In 1941 this average jumped to 417 pounds of butterfat—significant in view of the fact that a large part of the herd was made up of first and second calf heifers.

The Bellefeuille's for nearly twenty years had been on a strictly grass land program. "Wouldn't be bothered with corn silage," they said.

Another early cooperator was Clifton Chadwick of Randolph Center, also a devotee of grassland. With approximately 15½ acres of meadowland, Chadwick had been wintering 19 head of stock, including 11 high grade milkers, one bull, one horse and five young cattle. In addition he ranged on the meadow a flock of 1,000 laying hens. A half acre of meadow was planted to corn each year for poultry shade.

Down on the bottomland at South Randolph, Guy Young was doing wonders with hay production. On approximately 17 acres he produced enough hay to winter an excellent herd of 20

NOTE.—The author is district conservationist, Soil Conservation Service, Randolph, Vt.

Jersey milkers, a bull, a dozen young animals and a team of horses. Young hadn't turned a furrow in 16 years! He had, of course, fertilized heavily—about 18 loads of manure on every acre every year, all backed up by phosphate. Young got lots of hay, fully as high milk production as when he had grown corn, and the cost of his milk was lower.

Even a casual examination of weather and soil conditions revealed the reason for the success of these three farmers. An annual rainfall of 40 inches with excellent summer distribution, a cool, clear climate due to neighboring mountain ranges, and limestone soils, all spelled first-rate growing conditions for grasses and legumes.

These and other examples of success with grassland farming added up to a fairly imposing record. In the three instances cited, and in most others, no silage of any sort was used. Fact of greatest interest was not that a few farmers had been found who didn't bother to raise corn, but rather that these farmers were outstanding dairymen and community leaders. They were sound operators financially. Bellefeuille and Chadwick are leading each of the two local dairy improvement associations in total butterfat production.

The whole subject of grassland farming in the dairy section is both fascinating and complicated. Greatest barrier to the adoption of this type of farming on the rough farms in the area proved to be the fear of the effect of drought on hay production. Many farmers believed that growing corn silage provided greater assurance of adequate winter roughage than an all-grass program.

The district staff, however, leaned to the opinion that the greatest hazards to hay crops are low fertility and poor choice of species—not drought. Fertility levels were low as a result of erosional losses and of failure to replace plant foods removed in crop form. The average farmer believed the old adage that a wise man lets someone else do the experimenting.

Arrangements were made in 1941 with the Vermont Agricultural Experiment Station and the regional SCS nursery division to establish three series of grass and legume plots, one of which was carefully located on shallow, ledgy soil on a southerly slope. Careful observation of these plots taught the district staff much about the adaptation of species to site.

While these plots were being watched, members of the district staff lost no opportunity to help a cooperator in the management of hay or pasture lands. Outstanding results were publicized. The comparative fertility requirements of all crops produced locally, including various hay mixtures,

was stressed in farm visits. No aspect of hay or pasture management was overlooked.

By 1943, the staff felt that it had acquired enough information to prove that heavy crops of hay could be raised during dry years. Sizeable meadows on some of the coarsest, poorest soil in the district (outwash terrace soil from acid materials), were seeded to various combinations of tall oat grass, northern brome, orchard grass, alfalfa, ladino clover and—as a safety factor—alsike and red clover. Emphasis was placed on deep-rooted plants in order to overcome low surface moisture, high surface temperatures and leaching losses. Careful seeding, fertilizing and harvesting schedules were worked out. All work was carried out by farm owners and all materials except small amounts of special seed were purchased by them.

Minimum lime recommendations were one ton per acre plowed under, and another ton harrowed into the surface. Six to eight loads of manure reinforced with phosphate, 30 to 40 pounds of boron, and not less than 40 pounds of available potash in commercial form were also harrowed into the surface before seeding. Seeding was done with a hand seeder and the area immediately cultipacked.

The greatest stress was placed upon early seeding (not later than May 1), regular annual fertilizer applications and early harvesting. The best results occurred when fertilizer was applied about the first week in October. The standard top dressing is the same as at time of seeding, but without boron or lime. The soil is checked periodically for lime needs and the plants for indications of other deficiencies.



The type of outwash terrace soil on which the mixture of tall oat and other grasses did so well. The clump of tall oatgrass placed in the foreground for picture purposes became established and finally matured without further attention.



Partially matured stand of tall oatgrass, orchard grass, brome grass, ladino clover, red clover and alfalfa. Joseph Paquette farm.

This treatment of haylands may appear to be excessively fussy for an ordinary farmer, yet it is this attention to the needs of good hay that has brought home to cooperators in this district a better appreciation of the possibilities of grassland farming.

The experience of Eli and Joseph Paquette of Bethel, another congenial father and son team, illustrates this point. These operators picked a 2½ acre chunk of outwash terrace that had been “corned to death” because they and their predecessors couldn’t raise hay on it.

The mixture used was decided partly by availability of seed and partly out of the desire to make comparative observations. It consisted of 4 pounds of tall oat grass, 4 pounds of orchard grass, 2 pounds of brome grass, 5 pounds of alfalfa, one pound of ladino clover and 3 pounds of red clover per acre. The results have been so outstanding and so uniform (1944 was one of the driest summers on record in Vermont) that this stand has received widespread attention. The tall oat grass has been outstanding, although it is felt that the presence of orchard grass and brome grass tends to provide the support that gives this stand such a striking appearance. The associated plants mature uniformly.

Although there are many acres of ladino and timothy on the heavier soils of this farm, the Paquettes state that their herd of Holsteins not only shows decided preference for the hay grown on this poor piece of land, but jump about 10 per-

cent in production when fed on it. The stand has now been cut for three years and has shown no sign of deterioration. As expected, alfalfa is not so heavy as might be wished, but it is felt that continued attention to lime and fertilizer will be reflected by a better alfalfa stand at the next seeding. Although the annual cut has not been weighed, the owners estimate the 1944 yield at 4 tons. It has been fully as great in 1945.

The Paquettes are not only unconcerned about “fussiness” in hay management, but have recently announced that when the war is over they plan to drop their canning corn and grow hay alone on their cropland. The Paquettes heretofore took great pride in their corn. This pride has now been shifted to hay. They have thriftily used waste cobs and husks from the canning factory, plus stover, for silage. They plan to use grass silage in the future. This course of action was not suggested by the farm planner. The decision has been reached by the Paquettes, themselves, through observation of the results which they obtained through more careful management of hay on their farm.

What would one expect such a program to contribute on established grassland farms with high production records such as that of the Bellefeuille’s mentioned above? On this farm the roughage improvement program coincided with the maturing of a really outstanding breeding program. Joseph Bellefeuille who handles the feeding of the herd feels that improved roughage has contributed

heavily toward the following, startling HIR butterfat production record.

1940	375 lbs.	1943	532 lbs.
1941	417 lbs.	1944	611 lbs.
1942	468 lbs.		

The Bellefeuille herd, in 1944, attained an average milk production per cow of 11,095 pounds. This is the highest 2X average ever recorded by an American herd of the Jersey breed, according to the American Jersey Cattle Club. It was the highest level of milk production attained by any Jersey herd in the nation; in 1944, and the second highest butterfat production the same year, regardless of milking frequencies. Incidentally, profit above feed costs for this herd was \$389 per cow in 1944. The Bellefeuilles have long led their herd improvement association in low unit cost of milk production.

Although the concern of the district governing board with respect to strictly grassland farming was, and still remains, primarily for "problem farms," to its amazement farmers began to take matters into their own hands. Once the possibilities of grassland farming were fully realized, co-operators began shifting to an all-grass program so rapidly that it became difficult to keep district records up to date. The color of the soils map meant nothing to a cooperator who had made up his mind to dispense with corn silage. Approximately half of the cooperators are in grass at the present time.

Here again, coincidence no doubt has played an important part. For many farmers, the district hayland and pasture programs pointed a way out of the problems created by the wartime labor shortages. The experience of Clyde Estabrook of Randolph illustrates this well. In early March of 1943, Estabrook telephoned the district office to announce that he had lost his hired man, and that if he couldn't cut down on labor somehow he'd have to cut down on his milking herd. What did the district staff think about an all-grass program on his farm?

Estabrook didn't reduce the size of his herd. He didn't reduce the volume of much needed milk taken each morning to the milk plant. He didn't find another hired man. He didn't need one. He adopted grassland farming. Of course, 21 milkers and 15 young stock are a lot of animals for one man to take care of, but somehow Estabrook found time last year not only to take care of them well, but also to saw out 200 thousand shingles. He got out most of the logs for these also. This spring he even found time to paint his barns without assis-

tance. Estabrook is just a shade over five feet tall, and slight of build at that.

Grassland farming adds up to maximum conservation farming and fits naturally into a family-sized dairy operation.

CARTOGRAPHY AT WAR

(Continued from page 78)

scope and many features normally subordinated on maps and charts are of primary importance in radar navigation.

Prior to January 1945 the work performed for the Navy Department consisted of a number of small jobs; however, at this time a formal agreement was signed, making our reproduction facilities available to the Navy Hydrographic Office. Shortly after this agreement was signed the volume of work for the Navy increased to where our entire reproduction facilities were assigned to producing nautical and naval aeronautical charts. When hostilities ended there were a considerable number of nautical charts on the presses.

Another reasonably small project which continued throughout most of the war period was the compilation of aerial photo-maps. Photo-maps were prepared of a great many military areas throughout the United States and some foreign areas. The largest photo-map project covered approximately 25,000 square miles and was used in the Link trainer program.

In complying with the requests of the War and Navy Departments, it frequently has been necessary to discontinue all except the most pressing cartographic work for the Soil Conservation Service. Those responsible for establishing Service policies agreed that the type of work being performed for the War and Navy Departments should be given first priority.

Throughout the war period some operations were on a two-shift basis and for a considerable period three shifts were required. For several months while one project was in operation two 11-hour shifts per day on the basis of 13 days "on" and one day "off" were required. Information is not available regarding the total number of hours overtime worked (in excess of 48 hours per week) but I am sure this figure is quite large. Since September 1941 the work performed for war agencies amounted to about \$2,000,000.

Where are we going in agriculture? What is being planned for land-hungry veterans? These and many other urgent questions will be discussed in coming issues of SOIL CONSERVATION Magazine. Subscriptions may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.; \$1 per year, domestic.

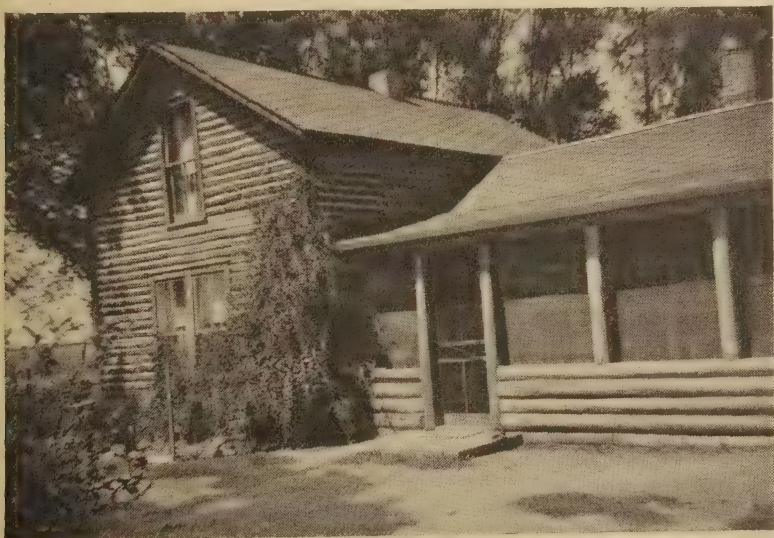
Hope Quickens in Eden Valley — Water Program Moves Ahead

By A. E. McClymonds

TRANSFER of the Water Conservation and Utilization Program from the Farm Security Administration to the Soil Conservation Service became effective in July. Immediately involved were 1325 families and 120,000 acres of irrigated land in 17 Western States. In announcing the shift of responsibility John A. Goe, Area Director, explained: "Popularly known as the Wheeler-Case program, it has for its purpose the development of irrigation projects in the Western States through joint operation of the Department of Agriculture and the Interior. The Act of 1939 authorizes the Department of Agriculture to develop lands for production under irrigation, acquire and divide lands into farms of suitable size, select families for occupancy, and sell developed farms to qualified operators. Such developments follow construction of large dams and other facilities by the Department of the Interior which make possible the utilization of water on land by farm families."

One of the projects referred to in this transfer is in the sagebrush country of Western Wyoming, called Eden Valley. It is located along the highway to Yellowstone Park, 40 miles north of Rock Springs, Wyo. This project has had a rather dramatic past. It had its beginning in 1906, when a private irrigation company constructed the first

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Neb.



One of the older homes which has been improved because of faith borne of dependable water.



Main canal loaded to very last inch of capacity prior to being cleaned out.



One of the new homes built on project as result of confidence of people in Wheeler-Case program.



Most of the farms are mechanized.



Guard rails installed as safety precaution at a turnout.

diversion dam on Big Sandy River, and built the canals for delivering water to lands which had been patented to the State under the authority of the Carey Act. The first settlers arrived in 1910. Due to the slowness with which the area was settled and water rights contracted for, the original company and two succeeding companies experienced serious financial difficulties during the 30 years of project operations.

In 1941 the federal government acquired the interest of the last of these companies and initiated development of an expanded project under authority of an item in the 1940 Interior Appropriation Act. Plans included construction by the Bureau of Reclamation of a storage reservoir on Big Sandy River which would insure late season water for lands being farmed under irrigation and provide water for an additional 10,000 acres. The Department of Agriculture was to take care of the preparation of the project for the efficient use of irrigation water and the sub-division and sale of the new lands to qualified farm operators. Some of the reservoirs are located at an elevation of 11,000 feet. When construction was halted by the War Production Board the Department operated the system and utilized its maintenance equipment for repair of the existing distribution system and development of privately owned lands for more effective use of water. Heavy construction work has been at more or less of a standstill since 1942. In interim the local project manager relied on inadequate "baling-wire" methods to effect many repairs and to restore the irrigation system to a point where it would function well.

One of the first jobs undertaken before the shutdown was the dredging of the first mile and a half of intake canal. This canal carried the water from the Big Sandy River to an off-channel reservoir. Twelve-thousand cubic yards of sand and silt were removed. The concrete drops on the intake canal were repaired. Both the inlet and outlet portals of the tunnel through which the waters of the reservoir are released were in dangerous condition but have now been repaired.

The main distribution canal has now been dredged and 22,000 cubic yards of silt have been removed. Thirty percent more water can be carried safely. To get water to many of the higher points and on certain pieces of land, loading the canal beyond the safety point had been a common practice. Through the installation of a siphon and side laterals, this situation has been corrected and now the canal is loaded within accepted safety capacity.

The main canal banks, where passing through

certain open areas because of high winds during the irrigation season, were severely damaged in many places by wave action. These banks have been protected with riprapping and other erosion resistant materials. The headgates and diversion gates, none of which was equipped with safety walks or guard rails, have had all such installations completed.

Much land leveling has been done, altogether about 2,000 acres on 40 different farms. Many soil surveys have been made, crop rotations have been worked out, pastures and hay meadows have been established. Dairy barns, livestock sheds, and homes show material improvement in appearance. Improvements in the Valley are a result of the faith that farmers and ranchers have in the prospects lighted up by Wheeler-Case program in their community.

"The leveling done on parts of my farm will make it possible for me to plant and irrigate some 10 to 12 acres of land which, previously, I have been unable to use," comments Robert W. Greig.

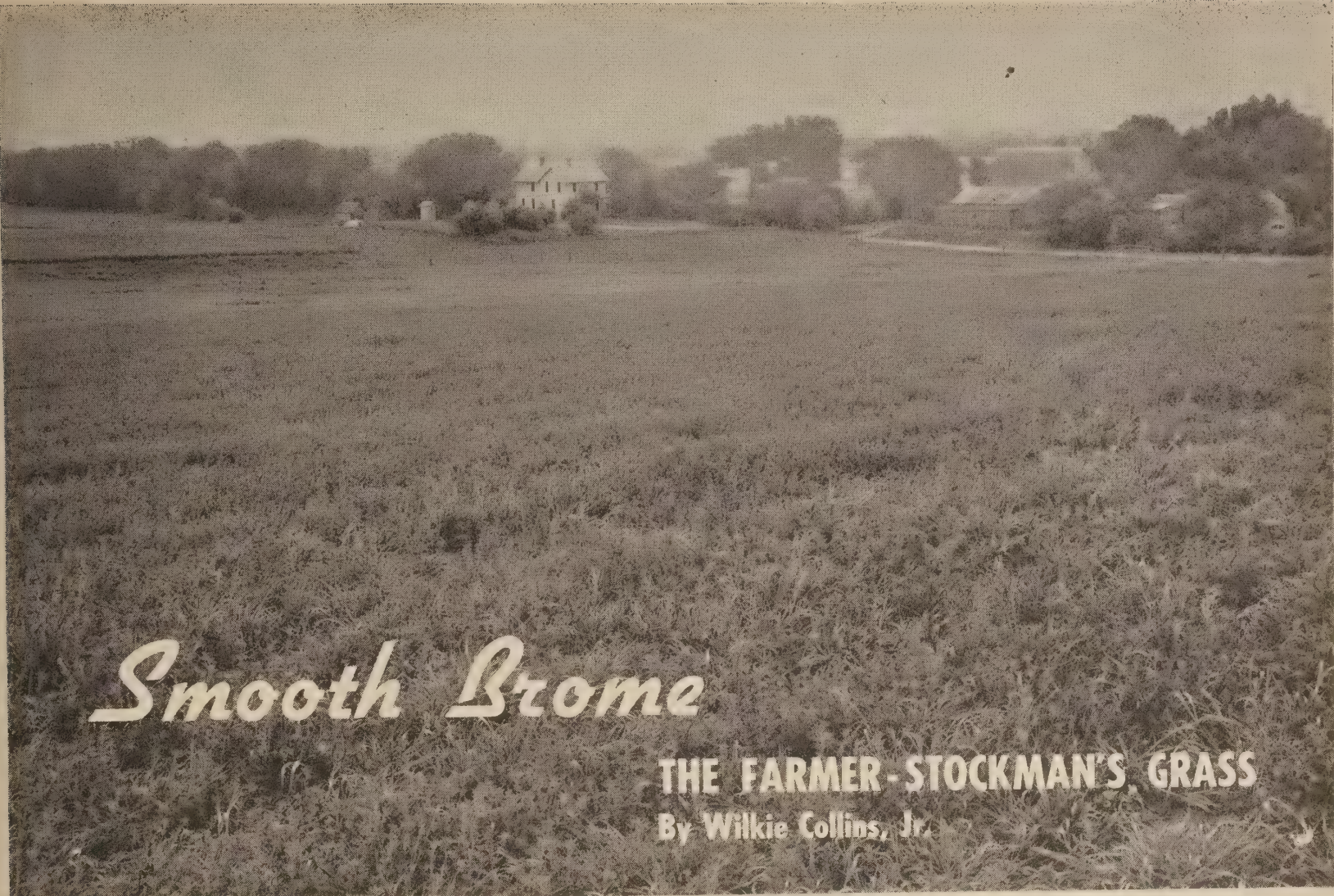
"One old, abandoned canal was filled in, and 17 acres of crop land, which was full of little gullies, was smoothed out and should produce double the crop hereafter," says Clarence N. Mershon.

Practically all farming operations in the Valley are mechanized. Tractors, haying equipment, and other mechanical tools are the rule. Farmers are interested chiefly in livestock and hay. Some root crops are raised, and increased production results on practically all fields on which new systems have been established. In fact, 100 bushels of oats to the acre was not uncommon in 1944 as contrasted to the former maximum of 25 to 40 bushels.

Among the many problems on this project were the uncertainty of water delivery, the improper preparation of fields for irrigation, the severe erosion in some of the supply ditches, the season-after-season silting in other ditches, the badly constructed or installed drops and turnout boxes, the poor drainage and the salting of many areas. Severe erosion, induced by inadequate provisions for water disposal, was apparent throughout the area.

Today the picture is quite different. Most of the supply ditches have been cleaned out. Many of the distribution systems have been improved through the establishment of drops that are technically good, and economically constructed and installed. Erosion and silt in the distribution system is practically at a standstill. Much land has been leveled. Good distribution has been effected. Some drainage has already been established. Flushing

(Continued on page 91)



Smooth Brome

THE FARMER-STOCKMAN'S GRASS

By Wilkie Collins, Jr.

SMOOTH brome is truly a farmer-stockman's grass. As a panacea for a great number of agricultural headaches, it's fast putting the proverbial county-fair patent medicine barker to shame. You see, smooth brome does do the job.

The ever-increasing popularity of this grass is giving it an important place in meeting the Nation's annual 160 million pound seed requirement. According to F. D. Keim, chairman of the Department of Agronomy at the Nebraska College of Agriculture there will be a million acres of Smooth brome in Nebraska by 1950.

The phenomenal increase of smooth brome acreage is due to the value of the grass as livestock feed, for conservation purposes, and for seed. Its large quantity of tough fibrous roots make it an excellent sod binder which can stand considerable abuse as well as silting and flooding.

According to R. L. Throckmorton, head of the Agronomy Department, Kansas State College, smooth brome in its region of adoption and when mixed with alfalfa or clover, has no equal for hay or pasture. It is rapidly assuming the place long held by bluegrass.

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Lincoln, Neb.

Terraces empty onto this brome-alfalfa pasture, seeded in 1939, Marshall County, Kan.

It is being used as a soil-conserving plant in rotations, for planting on steep cultivated slopes and in field draws, for buffer strips, for sod flumes and terrace outlets, for headlands around the fields, for roadside plantings, and . . . well, whatever the agricultural headache, give agriculturalists time and they'll come up with smooth brome as the answer, and be justified in doing so.

As a cash crop from Canada through the eastern parts of South Dakota, Nebraska, and Kansas on dry-farmed land, and farther west on irrigated land, smooth brome bows its head to no other grass. And, according to many farmers and stockmen, to no other crop. For increasing livestock production, for reducing winter feed needs, and for protecting land from erosion it is unexcelled in the area mentioned. The cash return from the seed alone makes many a crop take a fifth-row gallery seat.

Once introduced in a community, the acreage of smooth brome can grow by leaps and bounds. In Pawnee County, Neb., none was being grown in 1935, according to D. E. Hutchinson, Nebraska Extension soil conservationist although it was in

this county that one of the first trial plantings was made back in 1898. Now, more than 1,000 of the 1,300 farmers in the country are producing this hardy, long-lived perennial which provides excellent spring, early summer, and late fall pasture, as well as a high quality hay which, if harvested at the proper time, is nearly equal in protein content to alfalfa. And in Gage County alone there were over 31,000 acres of smooth brome in 1944.

Typical of the many experiences farmers have had with this grass is the one related by the Reverend Peter C. Krey. Cooperating with the Cass County, Neb., Soil Conservation District, Krey had 180 acres of smooth brome in various combinations with alfalfa, sweet clover, and red clover. In 1943 he grazed 100 steers on this grass. In 1944, he harvested 42,000 pounds of seed, and from August on pastured 135 head of cattle on the acreage and had feed to spare. The income that year from the 237-acre farm on which no grain was grown was \$6,500.

One of the oldest stands of smooth brome in the Northern Great Plains is on the J. B. Ryan farm, Holt County, Neb. The first planting was made on this unit in about 1900—20 years after its introduction into the United States. Seeded by Michael Holland, owner of the unit at that time, the original plot has furnished seed for all subsequent plantings. In the spring of 1944, Ryan harvested 32,000 pounds of seed from 150 acres.

From waterways and turn-rows alone, Vernon Cates, near Lyons, Neb., a cooperator with the Burt County Soil Conservation District, harvested 1,500 pounds of seed. Smooth brome seeded 5 years ago on bindweed-infested land on which sweet clover volunteered provided excellent pasture and held the bindweed under control, is the report of James Wardell, near Arlington. Herman Dinklage, Wisner, a cooperator with the Wayne County Soil Conservation District, has 140 acres of smooth brome and alfalfa and says that an acre will produce more beef than will an acre of corn.

David McCreath, Douglas County, Kan., state champion grass grower in Kansas for 1944, won his award on the returns he obtained from 16 acres of this grass. Seeding 20 pounds of seed per acre in September, he harvested 6,200 pounds of seed the following July and took off 920 bales of hay averaging 60½ pounds per bale. Later that same year when the second growth came on, he sold the young, green grass to a local dehydrater for \$4 per ton. The grass returned \$108 an acre.

George Whitcomb, Chase County, Kan., said

that of all grasses, both native and tame which are adapted to his farm, smooth brome is his favorite.

"Smooth Brome," he said, "will carry more livestock through a longer grazing season than any other grass and undoubtedly is more palatable to all classes of livestock."

As this grass in many cases becomes sod-bound after a few years' growth, farmers are seeding it in mixture with alfalfa. Joe Caplin, Holt county, Neb., one of the outstanding pioneer brome grass raisers in the Northern Great Plains, said that smooth brome and alfalfa were ideal companion crops and seem to do better when seeded together than when seeded alone.

"Brome grass tends to become sod-bound quicker when sown alone," he said. "This means it has used up available nitrogen in the soil. Mixing it with alfalfa takes care of this problem."

"Thousands of head of more cattle could be carried in Holt county, if the adapted land were in smooth brome. It and alfalfa have been more profitable to me than corn, and on top of that, I don't have to worry about soil erosion or getting my corn planted during wet springs. And when the ground is broken up and rotated, the crops produce much more."

Smooth brome and alfalfa served a definite purpose to C. B. Mehrens, Washington County, Neb., a cooperator with the Papio Soil Conservation District.

"I had a hillside which had been plowed for crops," Mehrens said. "The place was a source of trouble because silt washed down from the hill onto the farmyard. Since establishing the mixture, there has been no run-off water or washing of silt from the hill, and now I get a good production of hay and pasture on the hillside."

An outstanding proponent of smooth brome-alfalfa mixture is F. D. Allington, a supervisor of the Gage County, Neb., Soil Conservation District, who operates a 680-acre unit.

Allington said recently, "Smooth brome and alfalfa produce the largest amount of excellent quality hay of any of the hay crops. Brome-alfalfa mixture will make good pasture at least 8 months out of the year and furnish some green feed for pigs and calves any time it is not covered by snow. At times, I've been able to pasture hogs the full year."

"Old timers say the sod, when turned over, looks like virgin soil. When it rains, the pasture drinks in the water instead of letting it run off and erode the soil."



D. E. Hutchinson, Nebraska extension soil conservationist, takes a look at some smooth brome seed, Pawnee County



Breeding herd grazing in 500-acre smooth brome pasture,
Pawnee County, Neb.

"I received \$13,000 from my hogs in 1944 and spent only \$5,000 for feed. You can figure what the value of my 110-acre brome-alfalfa pasture is from that. The seed and hay brought an additional \$4,400.

"My average cash returns from brome seed, pasture, and hay since 1938 have nearly doubled what I might have expected from a similar acreage planted in wheat."

Throughout adapted areas in Kansas, Montana, Nebraska, North Dakota, South Dakota and Wyoming, the Soil Conservation Service, is using smooth brome, or brome and alfalfa, extensively in conservation of soil and water resources. At the same time, however, farmers are being cautioned about two things: adaptability of the strain; and the use of a leguminous crop to furnish nitrogen to the soil so that the grass will maintain its productivity.

Tests made by farmers in cooperation with Soil Conservation Service technicians, and results at state experiment stations, indicate that there is a considerable difference in the way the southern and northern strains of smooth brome perform in Nebraska and Kansas. When the northern or Canadian strain is grown not as much forage is produced, it is more difficult to establish a good stand, and yields of seed are considerably less. Since it is impossible to distinguish between the two strains by examining the seed, the demand for certified southern-strain seed is rapidly increasing. In Kansas, the Auchenbach smooth brome is being certified as a southern strain. And in 1944 approxi-



Holstein dairy cows and calves grazing on furrowed
pasture of brome and alfalfa, Washington County, Neb.

mately 61,250 pounds of the seed harvested were certified. In Nebraska the southern strain is certified as Lincoln type smooth brome, and last year 239,862 pounds of certified seed were harvested.

One of the leading producers of the Lincoln type seed is N. F. Schroeder, near Hoskins, Neb. In 1944, Schroeder produced 100,000 pounds. The certified seed sold for 30 cents per pound. In addition, he makes full use of the grass for grazing and hay. His original brome field was seeded in 1898 by his grandfather who obtained the seed from Nebraska University. After more than 40

years of continuous production, the original field is still outstanding. Three years ago, the yield of seed from this field was 823 pounds per acre.

According to Mr. Throckmorton, smooth brome needs nitrogen to yield appreciable amounts of seed. By adding nitrogen fertilizer and when there is ample moisture, smooth brome seed yields have increased considerably, and have more than doubled. He cites the effects of the application of ammonium sulphate in increasing yields.

The Michigan Experiment Station produced 326 pounds of smooth brome seed to the acre through



Guernseys in a smooth brome pasture, southeast of Republican City, Neb.

the application of 400 pounds of ammonium sulphate. Only 90 pounds of seed was harvested when no nitrogen was introduced. The University of Nebraska results show that superphosphate has no beneficial effect on seed yields when applied to smooth brome. However, application of ammonium sulphate, 100 to 300 pounds per acre, increased yields.

Soil Conservation Service technicians have been careful, when assisting soil conservation district cooperators, to explain the value of introducing a leguminous crop with smooth brome to prevent sod-binding and low production. Some farmers are remedying this condition by spreading barnyard manure, and more recently by applying ammonium nitrate.

Recent tests by the Soil Conservation Service at Manhattan show that early spring application of nitrogen fertilizer is a very simple method of increasing seed yields. On one farm in eastern Nebraska the owner applied uramon, a fertilizer of high nitrogen content, on part of his field. On the area fertilized he harvested 500 pounds of seed to the acre. Where no fertilizer was used no seed was produced.

One dollar will buy an acceptable Christmas gift for an up-and-coming farmer friend: a subscription to SOIL CONSERVATION Magazine.

Ten different soil conservation districts in northeastern Nebraska and southeastern South Dakota are carrying on fertilizer demonstrations on lands seeded to smooth brome. Ammonium nitrate was applied at the rate of 200 pounds to the acre in late March and early April. The nitrate was applied by the solution method. The results will show the effects of the nitrate on the old stands of brome grass.

Problems connected with seeding and growing smooth brome are few. The purpose of the demonstrations is to verify what has already been pretty well determined about the nitrogen needs of the crop.

To farmers throughout its area of adaptability, smooth brome is truly a farmer-stockman's grass. In the stretch of its race, it is truly passing virtually all other grasses qualified to run. It looks like a sure winner, a sure producer.



Smooth brome holds the soil, according to Joe Machalon, Saline County farmer—"even when picked up in sod form."

SOIL FERTILITY AND TRACE ELEMENTS

By W. A. ROACH

When Britain was faced with a shortage of shipping, she met in consequence not only a reduction of imported food but also of the mineral fertilizers so urgently needed to increase food production. The urgent need for increased food crops led to the utilization of land that in peacetime had been considered unfit for cultivation. Many special problems in plant nutrition therefore arose and a concerted attack was launched by the Agricultural Research Council acting in association with the Agricultural Improvement Council for England and Wales. Special attention was given to the detection and cure of mineral deficiencies and excesses in plants.

The importance of the major nutrients (nitrogen, phosphorus, potash and lime) had been fully realized following the work of Lawes and Gilbert a century ago; and a huge mineral fertilizer industry has grown up to supply the crops' requirements of these major nutrients. Magnesium has been known to be a constituent of chlorophyll, the all-important green coloring matter of plants, for a long time, and serious attention has been paid to the possibility of shortages of this element. The degree of importance of the trace elements, however, has not been realized until quite recently.

Diagnosis of Mineral Deficiencies. Professor Wallace, the director of Britain's Long Ashton Research Station, laid the foundation for the diagnosis of mineral deficiencies by the study of symptoms over twenty years ago. He grew plants in conditions which provided all necessary nutrients with some one major exception and studied the leaf symptoms resulting. These symptoms he used for diagnosing mineral deficiencies in the field. This symptom-description work has been taken up all over the world and applied to many agricultural plants, especially in America.

When symptoms are distinct and easily recognizable there is little need for other methods than this, but for many obscure cases other methods must be used. For this purpose, I started work on plant analysis and injection, mainly for fruit, over fifteen years ago; it was extended to primary food crops early in the world war.

Analysis reveals what is absorbed from the soil, and deficiencies may often be diagnosed on the basis of analysis alone, but this is by no means always possible. Because of the number of ele-

ments and of the minute amount of the trace elements, special chemical methods must be employed.

The widely used spectroscopic method is based on the fact that when a chemical element is heated to a very high temperature, it emits light of a characteristic color. In the spectograph such colors are separated and photographed as lines. The elements may be identified by the position of the lines, and their amounts may be determined from the densities of the lines.

Because of the difficulty of obtaining samples quite free from surface contamination by dust, spray or rain splashes I devised a method in which samples of only 0.025 g. of dry leaf material are needed. These are burnt in an oxyacetylene flame.

Plant Injection. The minimum requirement of each plant type for each nutrient must first be determined on healthy material and whenever a sample contains less than this amount a deficiency can be diagnosed on the basis of analysis alone. Trace elements, especially iron, frequently occur in the plant in a form which it cannot use; and, paradoxically, plants containing abnormally large amounts of iron frequently respond to the addition of more in a suitable form. This commonly happens in the presence of abnormally large amounts of calcium, the condition consequently being known as lime-induced chlorosis; and an excess of this element may be taken as an indication that one or more trace elements may be in an unsuitable form. For a definite diagnosis another method, e.g., plant injection, must be used.

Diagnostic injection consists in introducing solutions of the nutrients or mixtures each into a selected part of a plant and watching the effect by comparison with similar untreated parts of the plant. It is based on a number of fortunate facts: first, when a plant is cut, far from bleeding like an animal, it usually absorbs any watery liquid bathing the cut. If in the liquid colored dye is dissolved, its path in the plant may be traced visually. Instead of being pumped round the whole organism as in an animal, it travels limited distances along definite conducting tissues and is distributed thence into the leaf blade.

The mode and extent of travel depends on the size and position of the cut and varies from one plant species to another. A score or so of plants have so far been studied and for most of these it is possible to treat, or inject, at will, almost any part of the plant, from a tiny area between two neigh-

NOTE.—The author is with the East Malling Research Station, Kent, England.

boring veins of a leaf to a whole branch or even a whole tree. Most fortunately for the present purpose, substances introduced in this artificial manner produce similar effects to those resulting from ordinary absorption.

In the most commonly used method nutrients are introduced one or more at a time into one half of a leaf and the effect is seen, sometimes in two or three days, but more usually in a week or two, by comparison with the untreated half. The effect is revealed as either an improvement in color or "complexion", or increase in area or thickness and sometimes in all three respects.

Spraying Solutions. A further simple and quick method of diagnosis of trace elements and deficiencies which can be applied by technical officers and farmers and which works especially well for manganese and boron deficiencies, consists in spraying solutions containing the deficient minerals such as manganese sulphate and boric acid on the foliage of fairly young plants. An ordinary watering can fitted with a nozzle, may be used for field crops.

In practice 1 ounce of the mineral compound is dissolved in 5 gallons of water and sprayed over an area of 30 square yards.

Advisory officers and practical men have been quick to take advantage of all these methods.

Increased Potato Tonnage. The total failure of the potato crop over wide areas of ploughed up derelict lands in the west of England were proved by injection and analysis to be due to deficiencies of calcium and, to a less extent, magnesium. A

waste product was used to make good the deficiency, and as a result there was an increase of some 3,000 tons of potatoes in 1943.

The same two methods revealed that the cause of a most devastating trouble in cherries, which had puzzled experts for 30 years, was a deficiency of manganese. This has been made good by introducing small pellets of manganese sulphate into holes drilled in the trunk; and trees that have been barren for years have produced a few months later heavy crops. This rapidity of action of injected substances enables cures to be effected in trees while more slow acting remedial treatments are supplied to the soil.

These are instances of the kind of work that is being done to help in the great task of feeding the large population of Britain's small islands and which we hope will contribute to the prosperity of all countries in the days of peace.

New Zealand and Erosion

An interesting sidelight on the spread of soil conservation is presented by copies of New Zealand Conservation Regulations and basic conservation law recently received in Washington. Regulations concerning the treatment and use of land were adopted in 1945 for soil conservation districts in New Zealand.

The regulations provide that no person in any soil conservation district shall set fire to any tree, shrub, grass or other plant growing on the land, or severed therefrom except in a fireplace or on land around a dwellinghouse. Likewise, no person shall destroy or damage any tree, grass, or shrub, except on land adjacent to a dwellinghouse, whether on the surface of the land or in or on the banks of a watercourse.

To avoid or reduce soil erosion the committee (for the soil conservation district) after written notice, also may require a land occupier—

- (a) to change or restrict numbers, kind and class of livestock carried on the land,
- (b) to refrain for a specified period from stocking, ploughing, or cultivating any or all of his land,
- (c) to plant trees, grasses, shrubs or other plants where and by the time specified.
- (d) to carry out specified works or to do other prescribed things to reduce or prevent soil erosion and damage by flood,
- (e) not to change the present use of certain land or do anything that the committee thinks would promote soil erosion or promote damage by flood.

HOPE QUICKENS IN EDEN VALLEY

(Continued from page 84)

of many of the salty lands has been done. Delivery of water on time, and its equitable distribution, is assured.

The noxious weed situation was rather severe. It has been improved already, however, through the cleaning up of ditch banks, and the adoption of better farming and irrigation practices.

Eden Valley, as mentioned in the beginning, has a dramatic background. Brigham Young and his Mormon followers stopped in the Valley on their trek across the plains and mountains en route to Great Salt Lake and Utah.

Here, where the annual rainfall is less than 7 inches, the valley's rejuvenation will have a direct influence on the stability of the livestock industry. Better utilization can be made of the range when it is supported by an assurance of winter feed. A brighter future hangs on the rancher's hopes for a dependable water supply.

The committee is authorized to issue permits for burning in safe places where it will not cause soil erosion, and there are provisions for appeal and for changing regulations from time to time.

In New Zealand, soil conservation districts are established by declaration of the New Zealand Governor-General by "Order in Council" under the New Zealand "Soil Conservation and Rivers Control Act, 1941." The Soil Conservation and Rivers Control Council consists of six members besides the Governor-General—two officials of the country serving ex-officio and four appointed by the Governor-General. One of those appointed must be an officer of the Public Works Department; two must be recommended by the Minister as representing local authorities and boards, and one recommended by the Minister as representing agricultural and pastoral interests.

Each soil conservation district is run by a committee consisting of a "soil conservator" appointed directly by the council, one or more persons appointed by the council from nominations by local authorities and boards, and other persons appointed by the council because of specific knowledge of district problems but not greater in number than the appointments from nominations made by local authorities and boards.

—T. L. Gaston.

These, Too, Fight for Soil

In August *Soil Conservation* listed war veterans employed in the Washington office of the Soil Conservation Service. Nearby Beltsville, Md.—usually associated with National headquarters—also has an impressive contingent who once served in the armed forces:

Division of Cartography

World War I

Ancell, Vincent C., Jr.
Britsch, George
Byrnes, Thomas E.
Carey, James M.
Duffield, Gary
German, George B.
Kelsh, Harry T.
Snyder, Joseph M.
Walsh, Clarence R.

World War II

Davies, Robert C.
Holt, James A., Jr.
Merritt, Eugene
Rogers, Willie
Scherer, Andrew F.

Hillculture (World War I)

Houghton, L. S.
O'Rourke, Frances L.

Nursery (World War I)

Hall, Ira D.

REVIEWS

All over the land interest is quickening in the vital relationship of soil to nutrition. More and more concern is evidenced by the medical profession in many hitherto neglected details of the national diet. Much is surmised but far too little is known through actual experimentation. Grocery-store foods too often have provided the materials for laboratory research, with little or no question raised as to the sources of such materials—those soil sources which, it is now generally conceded, vary widely in nutritional content. "Must We Starve?"—reviewed below—is another stinging reminder to get busy, lest we all eat ourselves to death.—The Editor.

MUST WE STARVE? By Joseph James. F. Muller, Ltd., London. 1944.

This little book forcefully points out the pressing need for adequate research on soil depletion in relation to the health of plants, animals and humans. The author tells us that "every particle of fertile earth is a little world in miniature, pulsating with life." If the soil were not alive, human life itself would be impossible. He finds the concept of living soil so revolutionary "that it is not too much to say that its arrival means the opening of new avenues of advance for mankind." To understand the soil, James holds that we must study the effect of animals and plants upon it. "Given a right relationship between them and we get a fertile soil; upset that relationship and we get a desert."

Improper feeding of the soil causes it to become sick and a sick soil affects the health of plants and animals. "Consequently, we who feed on both plants and animals will suffer also." The author presents many observations showing that disease in our crops, in our fruit trees and amongst our domestic animals has greatly increased in recent years, concurrently with a profound change in farming methods. He believes it is impossible that there is no connection between health of plants and animals, and health of soil. "The trouble seems to be here: that having made our discoveries in the chemist's laboratory, we then apply to the soil compounds prepared by the chemist and that, in ways not yet understood, plant life is unable to assimilate its food in this form, and therefore starves." Opposed to this is evidence that soil fertility gained from natural manuring produced healthy soil, healthy plants and animals, and benefits human health.

"Good health is the greatest boon enjoyed by man, and if our methods of farming are jeopardising this, then the case for a thorough-going examination and careful experiment is abundantly made out. Without question, food is going to be a major problem for some years to come. It surely needs no emphasis that any attempts at this time of day to suppress, or even to modify, the now settled demands for a higher standard of living, are bound to have social and political consequences that every well-disposed person will do his utmost to avoid. That is one factor. Another is, that taking the world over, the output per unit under cultivation is falling. With both factors operative concurrently—as they are—it is obvious that we face a problem of unparalleled importance. Nevertheless, whilst disaster is only too possible, it is not inevitable. There is a way out, but it means an almost complete reversal of our way of thinking. We live in an age of science. Science, certainly, has invaded the fields. Enormous crops have resulted, but also new ills have appeared. That there may be a link between the new methods and the new ills seems not generally to have been remarked. Obviously, the matter cannot be decided by prejudice or by argument; it can only be decided by experiment. To do this it is essential that there should be undertaken a large-scale demonstration; large-scale both in area and time. Land of different qualities should be farmed—one section by natural methods, and one section—as nearly as possible comparable with the first—by scientific methods. The crops should be kept separate. Animals should be fed from these crops, and the results noted. Those fed from naturally grown foods should be kept exclusively on it, and likewise with the others. The experiment should be for a period of years. It should be undertaken by the Government. And that is where we come in. Government action in any matter depends upon public opinion. If the voice of the people were clamant in this matter no Government would resist."

—S.B.Detwiler.

HOW SOD AFFECTS ESTABLISHMENT OF HYBRID POPLAR PLANTATIONS. By Ernest J. Schreiner. *Journal of Forestry*. June 1945.

Here is a long treatise well worth study by anyone responsible for planting on old fields. For tree planting, these are deteriorated sites, not generally suitable for planting hardwoods. Even pines do better with some site preparation. Nature's method of reestablishing hardwoods is very slow and painstakingly deliberate. She first builds a forest soil by growing pioneer species such as sassafras, persimmon, buckbrush pines, etc.

The conservationist's and forester's problem is to adopt measures that in a few years will accomplish what nature does over a generation or two. One possible way of advancing the ecological process was reported by Sir Roy Robinson in *The Journal of the Society of Foresters of Great Britain* and reviewed in *Soil Conservation* March 1945. His method was to plant hardwoods with conifers as nurse crops so that the hardwoods could take hold as soon as the pines sufficiently changed the soil conditions to favor hardwood growth. The experiences of McIntyre at State College, Pennsylvania, seem to support Robinson's conclusion.

Now Schreiner has learned something about planting poplar on old fields which may be an alternative method of establishing other hardwoods. Briefly he reports success following two practices (1) turning the grass sod into the soil in which the trees are planted (the old method of turning the sod and planting in the furrow does not do this). He thinks that the incorporation of the sod into the soil adds enough organic matter "to tip the balance in favor of tree growth." (2) weeding the plantation during the first growing season. He advocates weeding for 2 or more years. However, with site preparation equivalent to plowing and with incorporation of sod into the soil, trees weeded only during the first year averaged 15 feet in height at the end of 4 years in contrast to 6.7 feet for trees not weeded.

—John F. Preston.

IF THE PROSPECT PLEASES. The West The Guidebooks Never Mention. By Ladd Haystead. University of Oklahoma Press. 1945.

Ladd Haystead, farm editor of *Fortune Magazine*, has made a contribution—like the war—to the unification of the American people. In his book he raises the question, just where does the West begin or just where is any line that sets any one group of us off against another? When he points out that the West is an area, a climate, a certain soil and certain vocations suited thereto, and not a form of society, he is telling us that different regions give differences in people. But these differences need not separate them as humans, or as citizens of a country and supporters of its causes. He is subtly calling upon us to crystallize out just what our American national philosophy is to be in the face of these differences among people in our own country, now about to become one among many countries of the world.

With history, empire has seemingly always been taking its way westward. But as Haystead

DEATH OF A GREAT ECOLOGIST

On July 26 Dr. Frederic E. Clements, internationally renowned ecologist, died in a Santa Barbara hospital of undulant fever. With his passing the Soil Conservation Service lost one of its most inspiring and loyal supporters and collaborators.

Dr. Clements was born, reared and educated in Lincoln, Neb. He first taught at the University of Nebraska, and later at the University of Minnesota. At the Carnegie Institute of Washington, D. C., he conducted a wide field of ecological investigations which lasted over a quarter of a century.

Dr. Clements has probably done more than any other man to make ecology a coherent science for agricultural workers. He consolidated the usable fragments of early ecology developed by his predecessors, added his own ingenious elaborations, and then wrote the language to describe the science.

In 1935 he became an official collaborator of the Soil Conservation Service, a position which he held until his retirement from Carnegie, nearly three years ago. Since then he has given his time freely and without charge to the Soil Conservation Service regions west of the Mississippi River. Last spring he was commissioned to give special training to Service personnel in ecology.

Dr. Clements had a rare gift for teaching those with whom he came in contact during his extensive travels over the nation. He pursued the Socratic method of teaching, using many Clementisian innovations with which he inspired students to carry on original studies of their own. Fortunately, several hundred of his outdoor students, who benefited from his teaching, are members of the Soil Conservation Service. He was a vigorous proponent of outdoor teaching, and he leavened his own experiences with those of others. His viewpoint was expansive and dynamic.

Constant companion at his laboratories at Santa Barbara, Cal., and Manitou, Col., and on his numerous cross-country explorations, was his wife, Dr. Edith S. Clements, artist and ecologist in her own right. Together, they formed one of the most illustrious husband-wife teams since the Curies of France.

The Clementisian thesis is based upon an equilateral triangle of land, water and biology which depends for its success upon the harmonious operation of all three. Fortunately, he wrote extensively and gave generously to all who sought his advice and teachings, with the result that he has left a permanent endowment to the science of ecology.

—B. W. Allred.

points out, this movement has been according to the resources which lead it here. The prospects of the West in some cases were over-rated, in other under-rated. As a consequence, ghost towns, booms, gushers, and various extremes of human experience have made up the record. This story suggests that the soil as made by the climate, more than the politics, is marking out the geographical limits of territories. Our South, and North, or our East and West, as they represent a particular struggle for food and shelter with generous or niggardly provisions, have given us attitudes that mark us out as different persons. We are a product of the particular area. Declining resources bring on the attitude of caution, while glittering prospects give the Westerner breeziness and make him a fellow "hail and well-met." "The Western proletariat haven't yet discovered they are proletariat, have little sense of caste, and probably know by their first names at least one or two millionaires who yesterday were school-mates without shoes,

or drove a tractor for a couple of dollars a day while they waited for oil wells, mines or some other fairy story to come true."

The book will be an encouragement to those prone to worry about postwar disintegration of the present national unity. It cleverly portrays our different attitudes for helpful understanding and tolerance of them. It speaks frankly as Haystead, a Westerner himself, can. It puts the West on the "fringe of the fairly tight and integrated balance of the Nation." But when distances are being annihilated and regional lines eliminated so readily now, "we cannot afford to have any division here at home."

This book by one in agriculture will be good reading to any one interested in the open country and all that the open country can now mean as the foundation of this country among all the countries of the world.

—W. A. Albrecht.

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SOIL CONSERVATION SERVICE

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The timber acre contributes its share to the farm business in dollars and cents. This

82-year-old farmer of Cairo, West Virginia, cut 33 units of pulpwood last year.

FARMERS URGED TO PRODUCE FOREST PRODUCTS for the RECONVERSION Period from War to Peace

*Your Farm Woodland is Still Needed to Supply
Lumber, Pulpwood, Naval Stores, Ties, Fuel*

Do not "strip" your woods. Cut conservatively, leaving a thrifty growing stock for future harvest. Your woodland will have a steady yield if young trees are given a chance.

GUARD AGAINST FOREST FIRES

See your Soil Conservation Service representative or county agent and local wood buyer for information on what to cut, how to cut, and how to sell.





NOVEMBER 1945

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION

CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

ISSUED MONTHLY BY SOIL CONSERVATION SERVICE, U. S. DEPT. OF AGRICULTURE, WASHINGTON, D. C.

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WELLINGTON BRINK EDITOR

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*Front Cover: Turkey on farm of C. J. Bevington, Mt. Vernon,
Ohio. Photographer: George Pace.*

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Our Ten-Year Job Ahead

By W. Lee Linkous



Jack Price, manager of the Glen Angus Farm near Bel Air, stops his tractor to chat with the author of this article.

HERE in the Harford County Soil Conservation District of Maryland we have our sights set for a 90-percent job of soil and water conservation within 10 years.

That may seem pretty optimistic, but it's what we're shooting at. And I think we can do it—big though the job is—if—

1. The Soil Conservation Service can give us the additional technical help we must have;
2. The State Extension Service keeps up its fine educational work without which we can't progress;
3. We can get the use of equipment (terracer, etc.), from county commissioners, highway people, private contractors, state and federal governments;
4. The people of the county, farmers and business men alike, recognize that this is a community job and lend us their active support;
5. We continue to get state appropriations and the support and advice of the State Soil Conservation Committee.

You might call the above the five planks in our platform, and they're not necessarily listed in the

order of importance. Each plank is dependent on the others. We can't do the job if any plank is missing, or even warped or splintered.

We know, too, that we can't do the job we've outlined in 10 years without stepping up our rate of progress. We're moving fast but not fast enough. The war slowed us down but now that the terrible mess is over we can look forward to more labor, more equipment, more materials. Now, with the coming of peace, is the time for us to intensify our efforts to put agriculture on a sound, permanent basis. We've got to nail down soil and conserve rainfall. It's late but not too late.

The soil and water conservation job, of course, is just about the most important thing in the country today. In Harford county it's the very foundation of future prosperity. Here's why. The land area of our county is 280,000 acres. Of this more than 206,000 acres are in farms. Our industry consists of one factory and one distillery. Thus, it's easy to see that the income which makes the wheels go 'round comes from our 2,200 dairy, poultry and vegetable farms. On this income depends the welfare of all our people, including the bankers and business men of our three towns, only one of which is incorporated.

NOTE.—The author is chairman, board of supervisors, Harford, County Soil Conservation District, Bel Air, Md.

Now take a quick look at a few of our conservation needs. Only about 5,900 acres of our cropland need no special erosion control or drainage practices. But the remainder of our cropland does need conservation practices such as strip cropping, contour furrowing and terracing. We know 65,000 acres need strip-cropping. Two million feet of diversions should be constructed. Obstruction removal of one million feet is needed to reorganize fields for conservation layouts. Our reforestation figure is 4,000 acres, and 40,000 acres of woodland need improvement cuttings. We have a land use adjustment problem, too. Eight thousand seven hundred acres now in crops should be used to produce permanent vegetation such as grass or trees.

Of course, the foregoing is only part of the picture. The point is that we know the size of the job ahead, and it's plenty big. We also know the man hours and the equipment hours and the technical hours it involves.

Let me try to show you in another way why this soil and water conservation job is so vital. I firmly believe if we hadn't started on this program another 25 years would have found us 50 percent out of business. The better farmers, of course, managed to keep gullies filled but we didn't pay much, if any, attention to sheet erosion. A few farmers were pretty careful, it is true. One went so far as to specify in his will that a pasture wasn't to be plowed for 20 years—said if his son didn't have sense enough not to do it by then it was no use. But, in the main, our eyes weren't opened to what was happening to our land until the Soil Conservation Service demonstration project, with its CCC camp, came along in 1936.

We learned then that the rate of erosion had been increasing year by year. More important, we learned that this terrible wastage could be controlled.

Since the demonstration projects we've come a long way. We originally organized a two-county soil conservation district in June, 1939. When the state law was amended we formed our own county district in September 1944, and have been operating as two districts since.

About a year ago we launched a real campaign to speed up the job. We sent out a circular and cards. We called our circular "For the Land's Sake Let's Farm Harford on the Level." I'd like to quote just briefly from this circular: "Contour farming pays. It is practical. It is patriotic. The man who lets his soil run away in the rain lets down his country and his kind. We are not trying to compel any one to do anything. We are appealing to reason in the light of proved results."

The response has, I think, given us the idea that we can get 90 percent of this big job done in the next 10 years. And I want to say right here that by "done" I don't mean we can sit back afterward. No, soil conservation is an everlasting job. It imposes the obligation of maintenance and further improvement as we learn more. But we do believe we can get 90 percent of the practices we need on the land in the next decade if we get the help and cooperation I've mentioned.

We're mighty lucky here in Harford county because we have the whole community back of us. The editors of our two Bel Air papers, John Worthington of *The Aegis* and Vaughn Flannery of *The Gazette*, both have farms. Their support has influenced public opinion greatly. A lot of folks who aren't farmers sat up and took notice recently when the papers printed our story about "The Ten Thousand Dollar Rain." It all happened on a six-mile stretch of one little watershed. We estimated the actual cost to the taxpayers at \$10,000. And we harped on the theme that every bit of the damage could have been prevented if all the farms in that watershed had been under control. We also stressed that this damage is multiplied many times over every year. We just happened to be able to produce the figures on this one.

Another real asset to our program is Attorney John E. Clark, whose colored slides and talks—offered at his own expense and on his own time—make our job easier.

We supervisors, and I'm speaking now for W. Vernay St. Clair, D. G. Harry, Jr., Howard W. Turner, and Worley N. Umbarger, believe we're headed in the right direction. At any rate, as I've said before, our sights are set for a 90-percent job in 10 years. Soil conservation is worth what it costs, no matter what it costs. We know our program will mean the saving of tremendous sums to the community. More important, it will save the land and the people.

DR. BENNETT HONORED

In recognition of his high standing as a scientist, Dr. Hugh Hammond Bennett, Chief of the Soil Conservation Service, has been elected a Fellow of The American Association for the Advancement of Science.

GOOD IDEA

Supervisors of a soil conservation district in Colorado recently subscribed for *Soil Conservation Magazine* on behalf of the 30 member farmers of the district. That's a tip for other districts. Price \$1, sent to Superintendent of Documents, Government Printing Office, Washington, D. C.



Soil Stewardship Brings More "Ups" Than "Downs"

By T. S. Buie

IT WAS early August, and the day was hot. But in the shade of the long front porch of the Camilla-Zack Rural Life Community Center building, it was comfortable. A piano was playing, and a group of Negro women school teachers was singing.

"Nobody knows the trouble I've seen," they sang.

More than 150 Negro men, women, and children seated in a semi-circle in the shade of pine trees in the yard joined in, "Sometimes I'm up—sometimes I'm down."

What we'd seen earlier during a tour of several farms in this all-Negro community in Hancock County, Ga., and what we later were to hear, was heartening evidence that soil conservation farm-

When Negroes get together, even to talk soil conservation, there's singing, dancing and gayety. This is a square dance performed by school teachers attending a summer session sponsored by Georgia State College at the Log Cabin Rural Life Center.

ing is helping to point to the day when Negro rural families will have more "ups" than "downs."

Now that the tour was over, the group had gathered at the pine log and native stone community center building to hear more about soil conservation, and to see \$200 in cash prizes passed out to Negro farmers. Supervisors of the Piedmont Soil Conservation District sponsored the meeting, and the cash was contributed by the Association for Advancement of Negro Country Life.

Josephus Johnson, young Negro technician employed by the Soil Conservation Service to work with these Log Cabin Community farmers, pre-

NOTE.—The author is regional conservator of the Southeastern Region, with headquarters at Spartanburg, S. C.



Farm people gather for soil conservation meeting at Camilla-Zack Country Life center.

sided. He called on Rev. J. T. McMillian for scripture reading and prayer. The minister read the parable of the sower, and then talked to God about "His soil."

There followed a program of entertainment and soil conservation addresses.

Negro Girl Scouts presented drills and dances. The women teachers, half of them garbed as men, offered a square dance. There was applause, laughter, singing.

O. D. Hall, assistant state conservationist for the Soil Conservation Service in Georgia, told the farmers that they were stewards and not owners of the land, and that they should be good stewards. Soil conservation work already done in the community was praised by District Supervisors Frank T. Denham and M. G. Pound and by District Conservationist G. E. McWhorter. They urged that the program be expanded until every acre on every farm is protected.

Then Benjamin F. Hubert rose with checks in his hand for \$200. Professor Hubert, as he's known by both colored and white, is a native of this community. The community life center building is named for his parents, Camilla and Zack Hubert. He is now president of Georgia State College for Negroes at Industrial College, near Savannah. He is also founder of the Association for Advancement of Negro Country Life.

"Land is the basis and source of all wealth. We must learn to love the land," the professor told

his audience. "Our great opportunity is right here in the heart of the Southland. We must make up our minds to stay here and take care of this land. When we do anything to improve the soil, we do something worth while for ourselves and for every other human being."

When it was time to distribute prizes for outstanding soil conservation practices, the name of Ulysses Heath was called first for a \$14 award. Before all the checks had been handed out, Heath was called back for three other \$14 prizes. He had grown the best winter pasture, and the best winter legumes. His lespedeza had won in competition open to all Negroes in the district. C. O. Brown had grown the best sericea lespedeza and kudzu, in the district, Isaiah Warren the best improved pasture, Jerry Head the best winter pasture in Morgan County, Melvin Beasley the best kudzu in the community.

Next year, Hubert said, the Association for Advancement of Negro Country Life will offer \$250 in prizes for soil conservation practices. And next year, too, the contest will be open to all the Negro farmers in 8 central Georgia Soil Conservation districts. These districts are Broad River, Ocanee River, Upper Ocmulgee, and Central Georgia. Next year's meeting will be a state-wide soil conservation jamboree, and Hubert expects it to grow into a South-wide soil conservation meeting for negroes, and then into a national meeting.

Southern bankers aren't overlooking the help

they can give. William Murphey, chairman of the board of directors of the Citizens and Southern National Bank at Savannah, has contributed a cash prize of \$100 annually to be awarded to the Negro farmer in Georgia or South Carolina who shows the greatest progress in soil conservation.

Supervisors of the Piedmont Soil Conservation District have promised their backing of the jamboree. So have Soil Conservation Service technicians and other agricultural workers.

This Log Cabin Community in Hancock County, Ga., is a good place for the jamboree. Nowhere else is there anything its equal.

The first land bought by Negroes in middle Georgia was that purchased by Zack Hubert, David Hubert, and Floyd Hubert, three ex-slave brothers, immediately after the War Between the States. They cleared the land, planted their crops,



Key men in rejuvenating the land: Josephus Johnson, at left, is a Soil Conservation Service technician who works with farmer-cooperators in the Log Cabin Community; Professor Hubert, at right, is outlining plans for a state-wide soil conservation jamboree next year.



A new log and native stone lodge for Negro Girl Scouts of Georgia goes up in the Log Cabin Community.

and harvested them. In three years they paid for 165 acres at \$10 an acre. Today Negroes own 27,000 acres of land in Hancock County. In the past six years Negroes have bought 25 farms here.

Erosion has severely damaged much of the land, as it has great areas of other land throughout the Southeast. Yields have declined. But today, with technical assistance provided by the Soil Conservation Service through the Piedmont Soil Conservation District, erosion is being controlled and soil productivity increased. Already 14 Negro far-



Four prizes go to Ulysses Heath for an A-1 job in soil conservation. Donated by the Association for the Advance-

ment of Negro Country Life, they are presented by President Benjamin F. Hubert (left) of Georgia State College.



Under a cropping rotation worked out with help from the cotton field. Next year the crotalaria will volunteer all Piedmont Soil Conservation District, Robert Heath planted crotalaria in every sixth row in contoured and terraced over the field.

mers, operating 3,356 acres in Log Cabin Community, are cooperating with the district in establishing complete soil conservation farming systems. The Extension Service, through the county agent, and the vocational agriculture teachers, are helping these farmers to obtain and improve beef and dairy herds and to graze them on the better pastures. Hubert is a district cooperator, and one of the stops made on the tour was for the purpose of looking at the improved pasture on his farm.

Each year for the past four years a beef cattle show and sale has been held at Log Cabin Community Center. Sponsored by the Negro farmers of the community and with help from Georgia State College, the Agricultural Extension Service and the Association for Negro Country Life, this show, according to Hubert, "is the only show and sale of beef cattle by colored people on record in America." Good cattle are coming from Negro farms, too. Nathaniel Dickson of Hancock County exhibited the state champion beef calf at the Annual State Fair in Augusta last April.

The Camilla-Zack Community Life Center building is the heart of activities. Nearby are a cooperative store and recreation shelter, a consolidated rural school building, a health center building, a Girl Scout building constructed this summer, cottages for teachers of Negro farm children who for 14 years have attended summer school sessions there under the sponsorship of Georgia State College; a blacksmith shop, and a canning plant.

The success of this community has prompted the *Atlanta Constitution* to say editorially, "The community was conceived by Professor Benjamin F. Hubert, well-known and respected Negro educator . . . Professor Hubert has followed the advice of the late Booker T. Washington, who said, 'Let down your buckets where you are.' The success of his rural community is significant and gratifying."

Log Cabin Community, already known widely as a place where Negroes are working together to solve their own farm and social problems and receiving help from white people to do it, may soon be known throughout the nation for its soil conservation and good land use program. That seems a likely result of the jamboree plans now being made. And Professor Hubert is shooting toward that goal. He wants Log Cabin Community to be a soil conservation show place by the time the state-wide jamboree is held next year. After that, he thinks, it ought to be easy to make the celebration South-wide and then National in scope.

AMERICAN SOCIETY OF AGRONOMY

The 1945 annual meeting of the American Society of Agronomy has been postponed from November 20-22 to February 27-March 1, 1946. It will be held at the Deshler-Wallick Hotel, Columbus, Ohio. Special conferences and committee meetings, including the meeting of the National Joint Committee on Fertilizers, will be scheduled for February 26.

"A Green Kid from the City" Revamps a Kansas Farm

By Herman W. Feldman



Herman Feldman with SCS technicians George E. Hart-rick and Vernon W. White on one of Feldman's terraced fields.

HERMAN W. FELDMAN is a cooperator with the Allen County Soil Conservation District. He lives near Carlyle, Kans.

The other pasture always looks greener. I'm one fellow who jumped the fence, and I'm still here.

To comply with the wishes of my parents, I dutifully took up business administration in college. After two years of alternately trying to build up interest in my course and looking around for something better, I simply left college. At home in Tulsa, Okla., I spent my days selling printing and my nights attending accounting classes—but the same old restlessness and dissatisfaction prevailed.

In 1938 my father purchased Stony Point Farm near Iola, Kans., and obtained a manager. After several trips to the farm with my father, I found myself hounding him to let me stay on the farm. In 1939 my big opportunity arrived and I was

soon there to stay—for better or for worse. Full of the confidence and exuberance of youth (I was only 20 then), the future looked bright. During that same period, I read an article in the Bnai Brith organizational magazine telling that there were 100,000 Jewish farmers in the United States. I immediately wrote a letter of correction; there were now 100,001 Jewish farmers. (There are now at least two others—my wife and my 3-year-old son.)

At first my neighbors accepted me skeptically. A few even warned me that I wouldn't last six months. After a few weeks, I was almost inclined to agree with them. Six years have passed since then—six years in which I've learned to farm, have become hardened to work, have married, have one son, have become a fairly efficient veterinarian and mechanic, and have found a way of life which I never knew existed.

When I first took over this farm, I had 20 cows,

125 chickens and a limited amount of used machinery. My farm then contained 200 acres, 125 of pasture and 75 of cultivated ground. In a short time, I was trying to milk 48 cows, take care of 50 head of beef and raise 20 calves, although my cultivated land had increased to 180 acres and the pasture to 175 acres. I thought that ample help would make this large scale operation successful. However, help, though obtainable, wasn't stationary, and I soon found myself struggling with everything and getting very little done. Now I'm farming the same 180 acres of land with good machinery. I have only 12 dairy cows, 50 head of beef and 400 chickens. I am not blessed with the necessary temperament to be a dairy farmer. This accounts for the sharp reduction in dairy stock. I find that beef cattle can bring a good return. By converting a hog house in addition to my regular poultry house, I have ample facilities for taking good care of 400 laying hens.

Certain experiences I've had out here will never be forgotten. I remember the day my hired couple got mad and quit; on the same day I came down with the flu. I wasn't married then and my mother and a neighbor came to my assistance.

Then, there was the winter the thermometer dropped to 22 degrees below zero. My 40 steers were half a mile away and as feeding time came, a storm swept in suddenly. I managed to take the steers enough feed to last for two days but walked most of the way home after midnight, as my tractor was in a snow bank where it remained for two days.

Yes, and there was the fall we shipped 30 head of fine grass-fattened, white face steers to the Kansas City market. They arrived there with the biggest run of cattle in recent history. The market broke and the profit of 18 months was wiped out at a single stroke.

One spring we raised 33 head of hogs and there was a shortage of feed. Flood conditions wouldn't let us ship, and feed conditions wouldn't let us keep the hogs. With a lot of hard work we finally got them to market at a premium.

The night my prize heifer freshened was an ordeal. One of my neighbors stayed up with me until 4:30 that morning. We were cold but we didn't dare leave. My wife kept bringing us hot coffee while she tried to hide her disappointment, as we had made plans weeks ahead to go to a social.

There was one summer that we tried to milk 48 cows and bind oats with an old binder. Once more my help quit and my 20-year-old brother helped me struggle through several nightmarish days.

I'll never forget the day one of my purebred Hampshire sows refused to claim her 8 pigs and again one of my neighbors came to the rescue.

But it takes more than good neighbors to make a farmer out of a raw recruit. In those first few years (and even now) I camped on the doorstep of the County Agent and the Soil Conservation Service. Now at least, I can work out a great many of my problems alone—but in those unforgettable days, any little problem would send me to one of the offices for a solution. The patience, understanding and cooperation of those individuals were a life saver to me.

With the help of the federal soil conservation payments and the technical advice of the Soil Conservation Service, I have immeasurably increased the value of my land. We'll never have to haul water again as we did that first year. We've built two ponds with the help of the soil conservation district and the county agent and now, no matter how dry the season, we'll always have an ample water supply. We also terraced 40 acres and this year we are experimenting with 29 acres of contour farming of row crops on an untterraced field.

In my first year, in order to control erosion on a gently sloping field, I seeded and obtained a good stand of 29 acres of alfalfa. I feel sure that lime and phosphate applications assured this success. Two top dressings of phosphate have been applied since.

Following the advice of the Soil Conservation Service, I applied lime at the time of seeding sweet clover on one particularly poor field of 24 acres. One of my neighbors said I couldn't obtain a satisfactory stand, but at the end of the next year I harvested a seed crop of \$30 per acre. That was in 1944. In 1945 I got \$25 per acre. In the three years previous to this sweet clover and lime treatment, the field lost money and crops grown had a sickly yellow color. The rye grown on that field this year was luxuriantly green at all times.

At this time 95 percent of my land has been seeded to legumes — some for two years and some for as long as four years. By applying lime each year, we now have 65 percent of our land limed. All of my small grain crops have been fertilized and the yields show the wisdom of this practice. This year I started fertilizing sorghums.

We have tried to hold row crop acreage to a minimum and have emphasized planting the more closely grown crops with as large a sweet clover acreage as we can manage. By using sweet clover, the ground is only worked once in two years and

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Helmer Anderson, of the Soil Conservation Service, helps farmer Shafer to select veneer logs from his farm woodlands. The sap buckets remind us that maple syrup is an important product of farm woods in the north country.



Bill Ferber, farmer, receives check for more than \$900 from the Farmer Union Co-op Manager, Lawrence Munich, as his share from a shipment of veneer logs.

Wisconsin's Co-Op Log Yards

By John W. Keller

THE marketing of farm woodland products frequently presents a stumbling block to carrying out soil conservation programs. Where there are few local markets and a lack of understanding exists as to scaling rules and grading methods, farmers are reluctant to spend time and effort protecting and managing their woodlands. Under these conditions, their products are likely to be of low grade and they seldom get full value. Many examples have been reported in which the prices received by the farmer were so low that he scarcely made wages and it did not pay to harvest the trees.

Soil Conservation Service workers in Dunn County, Wis., where 20 percent of the farm area is in woodland, decided that something should be done to remedy the situation. Martin M. Keliher, district conservationist, and Helmer Andersen, forester, went into the matter with the Dunn County Soil Conservation District Supervisors, the Extension Service and the board of directors of the Farmers Union. The Wisconsin co-op yards resulted.

By the time the log yards had been in operation a year, there had been a noticeable upswing in farmer interest not only in farm woodlands but in the soil conservation program as a whole. This started when farmers began to consider wood products as a farm crop and set about to protect their woodlands from fire and grazing.

How Co-op Log Yards Operate

The log yards are managed by a definitely "going" farmer organization. Each has developed around an already established organization, usually a cooperative oil company, a produce company, an equity warehouse, or a creamery. The yard

NOTE.—The author is assistant chief, Forestry Division, Soil Conservation Service, Washington, D. C.

agency makes a charge per unit of product. For handling logs, this charge ranges from \$2.50 to \$5 per thousand board feet and covers the costs of loading logs, keeping records of assembling and selling, making payment to cooperators, obtaining trackage rights and storage facilities, and other expense items. The farmer marks each log with his identification mark or name and makes delivery to the yard. When sufficient logs have been assembled for shipment, the co-op manager orders railroad cars for shipping, arranges for the purchasing company and the Soil Conservation Service to have representatives on hand to scale and grade, provides for loading, and attends to all other shipping details. The large veneer companies are interested in the yards and have guaranteed prices during certain periods. This enables the co-op to quote to farmers the exact prices obtainable for their logs. The purchaser sends a check in payment to the co-op manager, who deducts the handling charge and sends individual checks to the farmers.

Veneer logs have been the principal product, because farmers can get very favorable prices for No. 1 logs. The prices for No. 1 veneer logs in the yard range from \$50 per thousand for ash and elm to \$110 for yellow birch scaled by the Scribner Decimal "C" log rule. No. 2 veneer logs are worth about half as much as No. 1's and No. 3's bring about \$5 to \$10 less than No. 2's, or the same price as low-grade sawlogs. Co-op log yards can handle all kinds of products from farm woodlands.

Forestry specialists of the Soil Conservation Service report that the secret of getting high prices for wood products lies in the grading and that, particularly in the cases of veneer logs, farmers must know how to cut logs to get the highest grades. According to grading scales established by the OPA for veneer logs in Wisconsin, short No. 1 logs must be 12 inches or larger in diameter and must be clear of defects, 10-foot logs must have 5 feet of clear surface and not more than one standard defect, and 14- and 16-foot logs must have 7 and 8 feet clear, respectively, with not more than three standard defects. Deductions are made for heart rot, spiral grain, crotches, and crook exceeding specified minima.

Products are sold by the co-op manager to competing companies under contracts taking into consideration not only prices but also severity of application of grading rules and other factors that influence the amounts received by the farmers. When competition is keen the purchasing companies depend upon the log yards, and they have ap-

preciated the part played by them. The soil conservation districts enjoy a fine reputation for square dealing with both farmers and purchasing companies.

Neither the soil conservation district nor the co-op limits its assistance to district cooperators. Mimeographed statements, new releases, and letters from the Soil Conservation Service keep farmers informed concerning prices, species, grades, and related matters. Farmers may deliver from one log to a carload of logs to the log yard at any time during the year.

Dunn County Log Yards

The first of the log yards was started at Menomonie, in Dunn County, in November 1943. Here the soil conservation district supervisors observed that there was a definite need for simplified marketing of farm wood and products. Many farmers who had shipped large quantities of logs had experienced such large losses that they would not even consider selling logs any more. Farmers with only a few logs to sell had no outlet for their products. The log yard at Menomonie was so successful that before the shipping year was over five other yards were in operation in this county at convenient railroad sidings providing shortest haul for the largest number of interested farmers. These six yards were managed by the Farmers Union Co-op. They shipped 155 carloads of logs that averaged 5,500 board feet log scale. The plan for handling No. 2 and No. 3 logs was not uniform. In some cases a farmer brought in only No. 1 veneer logs, and had a portable sawmill come to his farm to saw the low-grade logs for home use. The Menomonie and Ridgeland yards offered farmers their choice of having their low-grade logs sawed at the yard or having them sold to manufacturers as logs. These yards held the No. 2 and No. 3 logs for lumber and ties processed by sawmills set up at the yards. The ties were sold by the co-op manager, but most of the rough lumber was taken home for use in repairs and construction about the farm. More than a thousand ties and a quarter million board feet of rough lumber were handled for the convenience of the farmers. The slabs were either hauled home by the farmer or sold at the yard for fuel. The regular co-op labor crew loaded the logs. The Service forestry specialist taught the farmers how to cut, scale and grade, and assisted the co-op manager to check-scale all logs sold.

During the first year 150 farmers marketed logs, lumber, and ties through the log yards and over 50 farmers had lumber and ties sawed at



Co-op log yard at Menomonie, Wis. Veneer logs at right, culls in foreground.

the yards. Six hundred farmers either came to the soil conservation district office for assistance in managing farm woodlands or attended meetings held in the woods. The Dunn County Soil Conservation District printed and distributed over 600 handy pocket log scales so that farmers could scale their own logs. The district also furnished interested farmers and cooperators with scaling procedures, grading practices, current data on markets and prices, and mimeographed instructions.

A tabulation was made of 55 farmers within the Dunn County Soil Conservation District who were not district cooperators but with whom contact was made through this marketing program. When Soil Conservation Service technicians are on a farm assisting with woodland problems, they talk with the farmer about crops, pastures, soil erosion, and the entire soil conservation district program. Of these 55 farmers, 40 actually sold logs through the log yards, 27 carried out conservation practices in selecting and cutting trees, and 34 showed interest in the entire soil conservation program. Of the last-mentioned group 12, as a result of this contact, had conservation plans made for their farms or signed district agreements, 6 put in contour or strip crops, and 3 fenced out woodlands.

Other Co-Op Log Yards

The co-op log yard movement has spread to surrounding soil conservation districts. During the year ending April 30, 1945, a total of 22 yards were operating in seven counties in Wisconsin. From October 1, 1944, to June 1, 1945, these log yards shipped a total of 260 carloads of veneer logs that averaged 5,500 board feet each and

brought in about \$75,000 cash to the participating farmers.

In Barron County, the Farmers Union Co-op has a complete marketing service available to all farmers who are cooperating in good farm woodland management. This includes trucking at 20 cents per mile per thousand board feet, loading logs on trucks at the highway, on the farm, and on railroad cars at the assembly point at \$5 per thousand board feet, and bookkeeping and other work required in assembling and selling at \$3 per thousand board feet.

Advantages of Co-op Log Yards

Soil conservation district supervisors and all interested agencies report that the Wisconsin co-operative log yards definitely have been a success. Benefits from operation of the yards may be summarized as follows:

1. The farmer has been relieved of all marketing difficulties in selling woodland products.
2. The co-op manager has access to the best markets, because he sells in large quantities, and can demand the highest prices.
3. Record-keeping details and the heavy work of loading are handled by the co-op at a low charge per thousand board feet.
4. Marketing facilities are available to any farmer who has even one log for sale.
5. All sales are check-scaled by the co-op manager and maybe spot check-scaled by Soil Conservation Service technicians until the co-op manager is thoroughly familiar with the job. This service is recognized as one that should not be continued indefinitely on a free basis. The district staff believes that it is neither reasonable nor desirable

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HOW GOVERN A DISTRICT?

By IVAN L. HOBSON

LAST year studies were made of the administration of 69 soil conservation districts in 19 states. They revealed striking contrasts between district governing bodies—brought to light a wide range of concepts, methods, and efficiency standards.

One of the supervisors of the Winooski Soil Conservation District in Vermont manages district equipment. He routes it, arranges for an operator, handles repairs, provides transportation, and collects payments. Supervisors in many other districts assume similar duties, such as responsibility for leases, lime production, distribution of trees, and school forests. But members of various other district governing bodies say they can not give time to the management of equipment or accept other job assignments.

In the Tygart's Valley District, W. Va., the governing body initiated a meeting of the representatives of cooperating agencies. With them, they worked out ways in which they can team up for work in soil conservation. On the other hand, one board of supervisors says the agency representatives ought to do the work and correlate their own activities. It held only two meetings last year and found no business requiring them to meet more frequently.

In some districts each supervisor is assigned a territory within the district, for which he is responsible to the board. In others, such as the Simi Soil Conservation District, Calif., which is a small intensively farmed area, the governing body conducts its business as a group—and the results are good.

The supervisors of a district in the Middle West found more than 90 prospective cooperators during a period of about two years. And yet—in some districts the members of the governing body take the position that it is not part of their job to find cooperators; that the responsibility to do so rests with the county agent, the technicians of the Soil Conservation Service, and others.

These are just a few of many contrasts.

Is it the function of a district governing body to manage equipment, tree distribution, or other continuing jobs? Is it proper for it to assign its members territory or committee work? Should supervisors correlate and guide the work of assisting agencies? Should they help find and develop local farm leaders, call meetings of farmers, and find landowners and operators who will cooperate with the district? Is it the business of supervisors to have a voice in determining the soil conservation practices to be recommended? Should members of governing bodies stimulate the cooperation of local newspapers, churches, schools, civic organizations and others? The studies made last year

indicate that these questions are being answered by governing bodies in many and diverse ways.

The Soil Conservation Service and the Extension Service have provided much assistance to soil conservation districts. Others have contributed substantially. These two agencies decided last year it was time to find out to what extent their personnel were influencing administration by district governing bodies and how they might help strengthen district administration. In order to do so, it would be necessary to find out whether the underlying philosophy expressed and implied in the enabling legislative acts of nearly all the States was really working out.

Speaking broadly, this philosophy says that the conservation of soil and water resources is dependent primarily on the initiative and the work of local land owners and operators; that these people, given the right powers and assistance, can and will conserve the soil and water resources; that the creation of governmental subdivisions of the State, providing them with certain powers in connection with soil conservation, would be the most democratic and the best way of achieving soil conservation; that duly appointed and elected representatives of the people could and would successfully manage the affairs of each district; that agencies concerned with conservation could serve farmers and ranchers best by providing help to these governmental units. These State laws are, in effect, conceived as bills of rights to farmers and ranchers—a new kind of venture in agricultural democracy.

At the time the first State soil conservation district acts were being passed, many people believed in this creed. But some thought governing bodies could not or would not fully administer the affairs of districts. Others said that, even if they could, public agencies cooperating with them would dominate district affairs and the districts would simply become projects of the agencies.

So the Soil Conservation Service, the Federal Extension Service, and 19 State Extension Services appointed men to go into territory other than that where they worked to study administration in soil conservation districts. They wanted to find out how these agencies, in their daily work, might help strengthen district administration. The districts were usually selected by State soil conservation committees and State soil conservation advisory committees. They arranged for the cooperation of the governing bodies. About the same number of districts were studied by Extension people as by Soil Conservation Service men. As noted, 69 districts in 19 States were studied. The answers found by Extension representatives were about the same as the answers found by Soil Conservation Service representatives. Both agencies aimed at finding the true facts. They made every effort to avoid bias. They recognized that these two Services, the State soil conservation committees, and most of the district governing bodies had not yet been able to draw a sure line between the duties of district governing bodies and the duties of assisting agencies.

A cross-section of the findings makes it apparent that many governing bodies are efficiently administering the affairs of districts. Thirty-six kinds of activities of governing bodies are reported. A rough approximation has been reached of the number of district governing bodies who in 1944 were very active, moderately or slightly active, and inactive with respect to each of these 36 items. In about 22 percent of the total kinds of work, governing

NOTE.—The author is chief, states relations division, Soil Conservation Service, Washington, D. C.

In the results of these studies we see an unusual opportunity open to personnel of the Soil Conservation Service and the Extension Service. This opportunity lies in finding and using the ways of working with district governing bodies that will most strengthen the local administration of districts by these legal representatives of land owners and operators.

H. H. BENNETT

Chief, Soil Conservation Service

M. L. WILSON

Director of Extension Work

bodies were very active, in about 45 percent they were moderately or slightly active, and in about 33 percent they were inactive. If the districts studied are representative of all 1,400, it seems evident that the board underlying philosophy is gradually becoming dynamic fact, and that most governing bodies eventually will administer the affairs of districts with a high degree of wisdom and efficiency.

Questions of first importance were: Is the personnel of the two agencies working with governing bodies in a way calculated to strengthen their administration, or do they in effect weaken it? How can they best serve to strengthen it?

The reports contained suggestions not only as to how governing bodies can strengthen district administration but also as to how State soil conservation committees, Extension Services, and the Soil Conservation Service can aid in this direction. No attempt will be made here to present these suggestions except those relating to the Soil Conservation Service. Those are briefly summarized.

Most district supervisors were appreciative of the assistance they were receiving from the Soil Conservation Service and had many fine things to say of technicians assigned to their districts. The chairman of one governing body said, "They are our boys." In this limited space, however, it seems more to the point to relate some of the ways in which, according to the reports, the Service and its personnel may be more helpful to the work of the supervisors. The following are some of the suggestions culled from the studies:

District conservationists can help strengthen the administration of districts by studying the State act with the supervisors and other assisting agencies, and counseling on district needs and the opportunities open to district supervisors under provisions of the act. The reports declare that there are many local organizations whose cooperation with the district would help speed conservation. They say that only a fraction of potential available help of this sort is being utilized.

Technicians of the Soil Conservation Service should distinguish, and should help supervisors distinguish, between functions of the governing body and functions of the Service personnel, and to encourage supervisors to carry out their responsibilities as fully as possible.

An important contribution that technicians of the Soil Conservation Service can make to district administration,

according to some reports, is to aid supervisors to gain full information on land conditions and treatment of the land in all parts of the district through first-hand observations. This is distinctly a field where technical training and experience can make such help appropriate. Knowledge of the land on the part of the supervisors is the base of good administration, it is said.

The Soil Conservation Service could help strengthen district administration by adjustments in certain policies and practices, such as shifting personnel less frequently and giving longer notice to the boards of supervisors when shifts are to be made; helping to make arrangements whereby others than technicians manage heavy equipment; avoiding the assumption that technicians only shall determine the conservation practices and measures to be employed.

The recommendation is made in one form or another that Soil Conservation Service technicians, particularly district conservationists, give greater consideration to the relative importance of matters they wish to bring before the board of supervisors before suggesting a meeting of the board. The studies show that sometimes meetings of supervisors are called at which only minor business such as small items of expense are considered.

Technicians should avoid recommending practices contrary to the district program without appropriate discussion with the supervisors. The reports frequently state that supervisors have no knowledge of some of the recommendations made to farmers and ranchers by technicians which, in effect, change the program.

Technicians should make suggestions to supervisors, upon request, in such matters as developing district programs and work plans, preparing annual reports, developing orders of business and agenda for supervisors meetings, and handling correspondence. They should avoid taking over such work or exerting undue influence in regard to it.

Procedures of the Service, in some cases, should be simplified and improved so that more of the time of technicians can be devoted to the land.

Most of the supervisors feel strongly the need for more effort to arouse the interest of land owners and operators in conservation, to inform them on how to meet conservation problems, how the district operates, and how to make adjustments of farm enterprises made necessary because of the adoption of conservation. They recognize, of course, that Extension Services have the responsibility of leadership in this field of work. They usually recognize, also, that farm conservation planners should devote all possible time to helping farmers with their plans and application of the plans. But because of the urgency of the need some supervisors and others stated that Service technicians should give more time to such work, particularly that relating to the widespread adoption of simpler or so-called starting practices.

In a few instances members of governing bodies feel that the Soil Conservation Service dominates district activities too much. One district supervisor resigned because he said there was too much ruling from the Service "up above."

On the other hand representatives of the Soil Conservation Service had, in a few instances, expressed the opinion that the governing bodies in some districts go too far in directing the personnel of the Service.

These studies have aroused widespread interest throughout this Service, the Extension Service, the State Soil conservation committees, the State soil conservation advisory committees, and the district governing bodies. In many states, joint plans have been made to work systematically toward a further strengthening of district government. In a number of states these plans are now being put into action. Those in other states will follow soon. In a number of states small groups of district governing bodies are meeting at intervals to work out an improved *modus operandi*. Then, too, area meetings of county agents and district conservationists are being held to discuss how they can work with governing bodies from day to day in a way that will best reinforce district government.

The common effort should bring common understanding. It should lead to increased farmer initiative and greater democracy in the furtherance of the district program for soil and water conservation.

INVENTORY TIME ROLLS AROUND

By R. W. ROGERS

RURAL and urban folk alike are becoming more and more interested in the accomplishments of soil conservation districts. On August 15, 1945 a total of 1,381 districts comprising an area of 763,454,931 acres in 45 states had been organized. In these districts are approximately 3,515,892 farms and ranches. Soil conservation districts are continuing to be formed throughout the country.

Most district governing bodies report annually their progress in soil and water conservation. Some state soil conservation committees (boards or commissions) are finding that annual summaries of district reports on a state basis are useful. These state committees apparently regard it desirable to (1) advise district governing bodies about their annual reports, (2) prepare and distribute the state summary for all districts, and (3) inform each district in the state of district accomplishments.

District governing bodies are accepting their responsibility for administering district work. They are exercising local leadership. They are making effective use of private, county, state and federal assistance to develop and carry out their conservation programs. As administrators and users of public funds, both state committees and district governing bodies realize the obligation of reporting on their stewardship to the people.

Accomplishment records are helpful in getting desired work done. The same records are useful and serve as a source of data and information about district progress. District governing bodies, sometimes with advice from the

state committee, make their own determinations as to the content of their reports.

Annual reports for 1944 were received by the Department of Agriculture from 1,116 districts. Most of them were in brief narrative form. Some contained illustrations. Others were printed. Perhaps more tables and quantitative expressions of accomplishments could have been used to good effect. Many varied subjects were discussed—too many to list all of them here. Generally the following main points were brought out:

(1) Farmers are vitally interested in soil and water conservation. Their interest, and work on the land, is increasing all the time. The report for the Moorefield Soil Conservation District in Arkansas said, "The general public, and the farmer in particular, are more interested in the conservation and preservation of their land than ever before."

(2) District governing bodies by experience are gaining a better understanding of their jobs. The supervisors of the York County, Pa., Soil Conservation District, had this to say: "We are now five years old. It has taken a lot of time, effort and patience, but now that results are being seen and public interest is rapidly growing, we feel we are being repaid."

(3) Yields per acre have been increased by establishing conservation practices and measures on the land. The following statement by Vann V. Secrest, long a cooperator of the Brown Creek Soil Conservation District, N. C. (the oldest district in the United States), bears on this: "My neighbors came over one morning after a heavy rain the night before, and asked why I was building (a house) on this farm, assuring me that I could not make a living on this land. This farm (has) produced more and more per acre from year to year. This past year I made 418 bushels barley on 10 acres, 1,126 bushels oats on 20 acres, 492 bushels corn on 12 acres, 23 bales cotton on 17.8 acres. Following the oats and barley, I harvested 33 tons of lespedeza hay and saved 4,700 pounds Kobe lespedeza seed, and I have a good 12 acres permanent pasture, which was planned by the soil conservationist."

(4) Often increased production resulted from better use of less land. Nearly every crop was mentioned in the reports. There were numerous records showing from 20 to 50 percent increases, sometimes more.

(5) Accomplishments on the land have increased despite the difficulties of wartime operations. From Atascosa County Soil Conservation District, we learn that "Despite shortages of heavy equipment, labor, and technically trained personnel, more has been accomplished in 1944 in planning, application, and maintenance of a complete soil conservation program than any previous year."

(6) Districts are looking to the future. Definite plans for immediate increased action are now going into effect. Boards of supervisors in Colorado, "in consideration of possible post war work and in analyzing the job to be done in the future, have spent considerable time and effort in determining needs of their districts and, in many cases, in preparing future plans." The Soil Conservation Service has assisted many districts throughout the country in determining conservation needs.

(7) Generally the problems presented were: lack of sufficient equipment, and maintenance and repair of that on hand; shortages of trained and experienced personnel; housing conditions; transportation; insufficient seed and

NOTE.—The author is chief, records and reports division, Soil Conservation Service, Washington, D. C.

planting stock in kind and amounts needed; and lack of correlation of agency activities within districts toward a common objective.

All of these things, and more, were brought out in the districts' annual reports. Each report was useful. However, it is felt that much of the possible usefulness is lost unless such data are sufficiently uniform to be summarized and used on a broad basis.

The extent of distribution of each district report is determined by its content and purpose. Each copy has definite specific values and is distributed accordingly. Parts, or all of a report may be of particular interest to farmers and ranchers with whom the district is working; to the public generally, through the local press and radio; or to groups and agencies assisting the district. Such reports serve as educational tools in public schools, agricultural meetings and community discussions. Local, state and federal departments furnishing financial aid and other assistance to districts are interested in the accomplishments shown.

There is a real opportunity for state soil conservation committees to help district governing bodies by advising them concerning their annual reports. A general outline or guide containing suggested tables or forms would be helpful.

State summaries for 1944 were issued by the state soil conservation committees in Indiana, Iowa, Kentucky, South Carolina, Washington, West Virginia and New Mexico. The publication "Soil Conservation Districts in South Carolina, June, 1945," is an excellent example. The Indiana summary had this statement in its first paragraph: "The

committee plans to put out a 'Bulletin' at this time each year so that the progress and comparisons of accomplishments from year to year may be made." A good many other states have indicated their intent to do likewise. The most outstanding state summaries, based on districts reports, seem to be those which include tabular summaries with brief narrative explanation. Some of the summaries gave briefly the highlights for each district.

It is desirable for state summaries of district reports to (1) reflect the ideas of local leaders, (2) contain summarized data of outstanding accomplishments, and (3) point out definite needs for improvements. This type of presentation is of benefit to members of state soil conservation committees, district governing bodies in the state, agricultural colleges, experiment stations, members of State and Federal legislatures, representatives of agencies serving districts, and others interested in conservation.

There are many uses and justifications for well prepared district reports. Made periodically they give an inventory of progress and accomplishments. They provide a basis for projecting future district work. They point out varying problems and needs. The factual information they contain has certain historical value.

In a democracy it is the people who govern. Soil conservation districts represent democracy in action in the most rapidly expanding balanced conservation movement any country has ever seen. It is of common interest to report to all the people the activities and accomplishments of soil conservation districts.

"GREEN KID" REVAMPS FARM

(Continued from page 106)

is not so subjected to damaging rains and erosion. The temporary pasture provided in the late fall and early spring reduces feed requirements. Sweet clover has stimulated our ground and reduced our feed requirements to the extent that 12 acres of Atlas sorgo will supply the necessary feed, whereas 19 acres were formerly required. This year, our row crop, in spite of excessive rains, is green as compared with many fields of yellowish row crops in the vicinity. Sweet clover is responsible.

This year we plan to utilize first year sweet clover as grass silage, with Atlas sorgo as a preservative. If our venture is successful, it will reduce our row crop acreage still further.

Our triple-A earnings thus far have totaled almost \$1500. We expect to earn another \$450 in 1945. This all goes toward a special fund to carry on soil-building practices. We fully realize that we can't get something for nothing. We must return fertility to the soil.

I hope that nothing in these remarks overshadows the soil conserving practices that have been instituted here after so much careful planning. My experiences for the most part just happened. The management practices were the best that could be planned by the best minds.

CO-OP LOG YARDS

(Continued from page 109)

to expect the co-op to assume the entire scaling job. They believe the yards will have better acceptance by farmers if a trained forester, known and respected as a public servant, handles the check scaling. This does not mean that the Service forester would scale all the logs, but he should appear from time to time to check-scale and see that the farmer's interests are protected.

6. When the Soil Conservation Service technician is on the farm woodland, he discusses with the farmer the entire district program.

7. Log yards serve as a point of contacts with new farmers, which can result in the establishment of conservation practices on entire farms. Woodlands work becomes a "starting practice."

8. Farmers are being trained to work in farm woodlands and carry out conservation practices.

9. The yards contribute toward postwar needs by putting critical materials on the market.

10. The Service technician trains the co-op manager to check scale and understand the details of selling wood products.

County agents, the extension forester, and the State forester have cooperated with the soil conservation districts in making the Wisconsin log yards a success.

Pastures Pay the Water Bill

By Elizabeth Poe



Irrigated pasture mixture on farm of Joe Schwartzman, meat packer, who farms 720 acres south of Albuquerque. Schwartzman plans to convert his entire irrigable acreage to permanent pasture mixtures as soon as he can get his land leveled and prepared.

RECENT tests on dairy farms and cattle ranches in the Southwest have shown irrigated pastures to be economical for feeding cattle, and effective in increasing milk and meat production, reducing labor and preventing soil erosion.

Farmers in southern Arizona who thought it impracticable to plant perennial grass-legume pastures on high-priced irrigated farm land discovered to their great astonishment that the income from irrigated pastures sometimes ran as high as \$130 an acre. In nearly every instance the returns amounted to more than they had made off the same land with cash crops.

Ten dairy animals on an irrigated pasture in Utah produced from 4 to 5 extra gallons of milk a day. Lambs pastured on irrigated fields weighed 20 pounds more than lambs grazed on good native grazing land. And in Colorado a 12-acre irrigated pasture required 80 percent less labor for maintenance and provided a 50 percent increase in profit in comparison with the same land in crops.

Besides these benefits, there are other results of a properly managed irrigated pasture that

aren't discernible with the first harvest. Cattlemen know that a pasture fenced for rotational grazing will last infinitely longer than one grazed indiscriminately, because time is allowed between grazings for the grass to make new growth. The same is true of irrigated pastures.

Irrigated pastures are subject to serious erosion unless they are properly leveled before the seed is planted. Elimination of high and low spots makes for efficient irrigation that won't erode valuable topsoil. An irrigated mixed grass-legume pasture also has a lower insurance risk than any other crop, when it comes to damage by hail, cloud-bursts, flooding, soil erosion, and insect and disease pests.

Irrigated pastures were introduced in southeastern Arizona in 1940 when Mervin H. Wallace, area agronomist for the Soil Conservation Service, persuaded a dairyman and livestock farmer near Duncan to make exploratory pasture plantings. The plantings were highly successful, and additional pastures, totaling 218 acres, were planted in 1942. At present there are 2,221 acres of irrigated pasture planted in this area—more than 7½ percent of the total irrigated acreage in the valley.

NOTE.—The author is head, press and radio section, Regional Division of Information, Soil Conservation Service, Albuquerque, N. M.

Willard Welker, who owns 547 acres of cultivated land near Safford, Ariz., has been raising sugar beet seed, barley, cotton, alfalfa, corn, and grain sorghums for 30 years. After watching the experiences of his neighbors with irrigated pastures, he decided to plant 22½ acres to 11 different grass mixtures. This land had been in cotton for 13 straight years and was run down in fertility.

In November 1943 Welker, who cooperates with the Gila Valley Soil Conservation District, bought 146 head of Hereford calves, averaging 412 pounds in weight, and turned them on his pasture mixture. Ten months later, the average weight of the animals was 800 pounds. The following June Welker sold 37 head of cattle fattened on the pasture at \$14 per hundred pounds for steers and \$13 for heifers. This sale was made on the Los Angeles market on a day when pen-fattened cattle sold for \$14.65 per hundred pounds. The Welker cattle had received no fattening ration other than the pasture mixture.

Among the practices that Welker recommends for running profitable irrigated pastures is rotational grazing. He says that more beef will be produced on an undergrazed pasture than on one that has been grazed too heavily. It is also vital to keep cattle off the pasture while the ground is wet—particularly during the first three or four years of a pasture's life, while a strong sod cover is being formed. Welker irrigates his 22 acres of pasture by the border method, using shallow furrows. He says that the lengths of irrigation runs should be spaced so that the water will go through in a reasonable time with a minimum loss through deep percolation. Water moves through a properly managed grass-legume cover slower than it will go through an alfalfa field, he says, and where there is a scarcity of water, runs on grass-legume fields should be reduced to from one-third to one-half the length of runs on alfalfa fields. For Mr. Welker's soil type, irrigation every two weeks is sufficient. His practice is to allow cattle "on" five days and "off" seven days. Two pastures are the minimum required for good management but three or more are preferable.

Probably the largest irrigated pasture in the whole region lies on the outskirts of Albuquerque, N. Mex. Here Joe Schwartzman, Albuquerque meat packer, is preparing to put his entire irrigable area of 720 acres into irrigated pasture as soon as he can get his land ready.

This decision was made after Schwartzman leveled and drained 120 acres of lowlands, near the

Rio Grande, and planted it to a mixture of sweet clover and sudan grass. The pasture was planted in July 1945, and two months later the grass was taller than the cattle themselves. Schwartzman estimates that this field will produce 12 cow months an acre of feed per year.

Soil Conservation Service technicians checked the irrigation of this 120-acre field after it was leveled and found that water needed only 45 minutes to run the length of 800-foot borders. The water spread uniformly over practically every bit of the land within each border.

Grover C. Killpack, a cooperator with the Huntington River Soil Conservation District, who farms near Price, Utah, was selling 65-pounds lambs five years ago. He believed that if he converted some of his native pasture and cultivated land to irrigated pasture, he could fatten his lambs. After he had clearing and leveling division fences were built and dairy stock were allowed to run on his pasture. This solved a serious labor shortage because Killpack's two sons had joined the armed services and his 14-year-old daughter was the only help he had left. His dairy stock and sheep had always been fed at the corrals before the pastures were opened. The lambs fed on this pasture weigh 85 pounds when they are taken to market, and milk production from his 10 dairy cattle has increased 4 to 5 gallons per day.

In the northwest corner of New Mexico, a farmer had an unproductive apple orchard. The water table had risen so high that the few apples the trees did produce were not fit to market, so the owner decided to convert the 2½ acre orchard to irrigated pasture. He borrowed a bulldozer from the San Juan Soil Conservation District and

(Continued on page 119)



Grass almost conceals cows in Schwartzman's 120-acre irrigated pasture.

Somaliland Fights Erosion

By Capt. R. A. Moor



Water is pumped by hand from deep wells.

AN *AMBITIOUS* irrigation plan is being carried out in British Somaliland to combat soil erosion and bring much-needed fertility to this largely uncultivated land. Experiments aimed at discovering the extent to which the protectorate can be made agriculturally self-supporting are being conducted by the military government.

British Somaliland, with its sun-scorched terrain and a stunted vegetation which wins precarious life from an arid earth, has hitherto been regarded as fit to feed little but the camels which thrive on its thorny scrub. Apart from a few small holdings, only spasmodic and half-hearted attempts have been made to raise crops in the past, and the bulk of the country's foodstuffs have been imported—principally millet from Ethiopia and rice from India.

At the turn of this century, the possibilities of

agricultural development were recognized by the Chief Commissioner but the Mullah campaigns, which lasted intermittently for 20 years prevented his ideas from being put into practice. It is little known that the "mad" Somali leader himself was a successful agriculturalist who grew grain and stored it in his fortresses in the East of the territory and maintained grazing reserves for his ponies, camels and stock. After his death in 1921, his influence waned and all incentive towards the growing of crops quickly disappeared.

World War II has changed the Somali's outlook: it has found loopholes in his economy. He finds that he can no longer import food in the quantity he needs from overseas and he is now more ready to accept the British Government's lead in developing food production at home. That lead is being given with energy and imagination. Its first object is to combat the soil erosion which is the main enemy of crop cultivation in Africa.

EDITOR'S NOTE.—The author is with the British East African Command.



When rain falls, the tugs quickly become raging torrents down which millions of gallons of water rush to waste, carrying away precious soil. It is planned to trap this water to bring fertility to the country.

The chief factors in erosion are water and wind—the rains which thrash down at such a rate that the earth cannot absorb them, so that they run away in torrents and carry off valuable soil in their train, and the Kharif, which blows from the south for three months of the year and often reduces visibility to a matter of yards with the dust it raises and flings to waste.

There are no rivers in British Somaliland. The springs which gush from the hills peter out after a few miles, in a patch of wet earth or sand. Instead, there are tugs—great natural drainage channels which gash and furrow the face of the countryside. For the greater part of the year they remain dry but, in an hour, when the rains fall, they become rushing brown torrents down which three or four million tons of water may pour in a day. Like the springs, they seep away into the parched earth.



Prisoners from a civil jail tend a vegetable crop beneath richly-bearing pawpaw trees.

The Department of Agriculture's proposal is to harness part of the many millions of tons of rain-water which pour down the tugs in the course of a year to a form of Yemen agriculture. The principle of this process (practiced successfully by the Arabs of the Yemen and in coastal regions of Eritrea) is to build a 30-foot high wall of sand across a tug and divert the dammed water along channels into large fields surrounded by banks 5 or 8 feet high. The trapped water is sufficient to soak the land thoroughly and yield a crop.

The agricultural department, in the first instance, is confining its experiments to the maritime plain, but there are other areas—especially in the west of British Somaliland—where there appear to be fair prospects of success for rain crops.

A somewhat startling example of the capacity of this land for cultivation is encountered on the road from Berbera to Sheikh where, after driving for miles through a parched and rocky country, one is suddenly confronted by the lush vegetable gardens of Bihendulah and Manjasi. The former flourish on their terraces on the waters of a spring which splashes from a neighboring hill and spreads a vivid green carpet of thick grass edged by towering trees along its brief path. The much larger Manjasi gardens are maintained with more difficulty but even greater success a few miles away by prisoners from civil jails who pump water from

man-made wells and direct it along irrigation channels.

Large quantities of vegetables and fruit are raised here and they go a long way towards provisioning the army in British Somaliland. Other large gardens have been started for this purpose at Borama, Horo Hedle and Medishe and a total goal of some 80,000 pounds of vegetables will, it is hoped, be reached this year.

"With the assistance of a suitable grant we are attempting to make the country self-supporting," the Director of Agriculture told me. "It can only be done by training the Somalis to recognize the advantage of agriculture. There is no possibility of white settlers doing it because there are none. At present there are only a few native small holdings but the average Somali is changing his views about agriculture. His natural business and livelihood is the maintenance of stock but the war, with its cessation of imports, has brought home to him the need for his agricultural development.

"This has always been primarily a grazing country and we intend to improve the pasturage, too. The British Government has two highly qualified experts in grazing here now and they are making an inspection of the country.

"We want to start a big experimental station and education center. A great deal of importance is attached to education and one thing in which we shall have to educate the people is to plant



One of the tugs, or natural watercourses, which furrow the terrain and remain dry for the greater part of the year.



The fruit and vegetable gardens at Manjasi are a striking example of the life which water brings to an otherwise semibarren soil. Water is diverted along irrigation channels to the fruit trees and vegetable beds.

instead of destroy trees, which greatly improve the soil.

Apart from grain and roots, an important food which the Somali will be encouraged to grow is dates. At one time there was a great deal of date cultivation in the country, but the production has dropped considerably since the biggest plantation was destroyed during a tribal "disagreement." An expert from Arabia has been called in to examine the possibilities of date growing in the country and the agricultural department has already planted a big acreage in which the shoots have shown signs of doing well.

Great importance is attached to these British Somaliland attempts to bring fertility to a semi-barren land and although definite results will not be known for some time, the progress of the experiments will be followed with interest.

PASTURES PAY THE WATER BILL

(Continued from page 115)

pushed out the trees—an operation that cost him less than the price of spraying them for one season. The pasture that replaced the trees has an average grazing capacity of 3 animal units for six months out of the year, and there's much less feed to buy for the stock.

Irrigated pastures have been planted all over the southwestern states, and reports of their success are coming to the State extension service offices, as well as to the Soil Conservation Service. Indications are that irrigated pastures will continue to increase, and that their value will rise steadily as more is learned about the behavior of the perennial grass and legume species in various parts of the country.

REFERENCE LIST ☆☆

Compiled by William L. Robey, Printing & Distribution Unit

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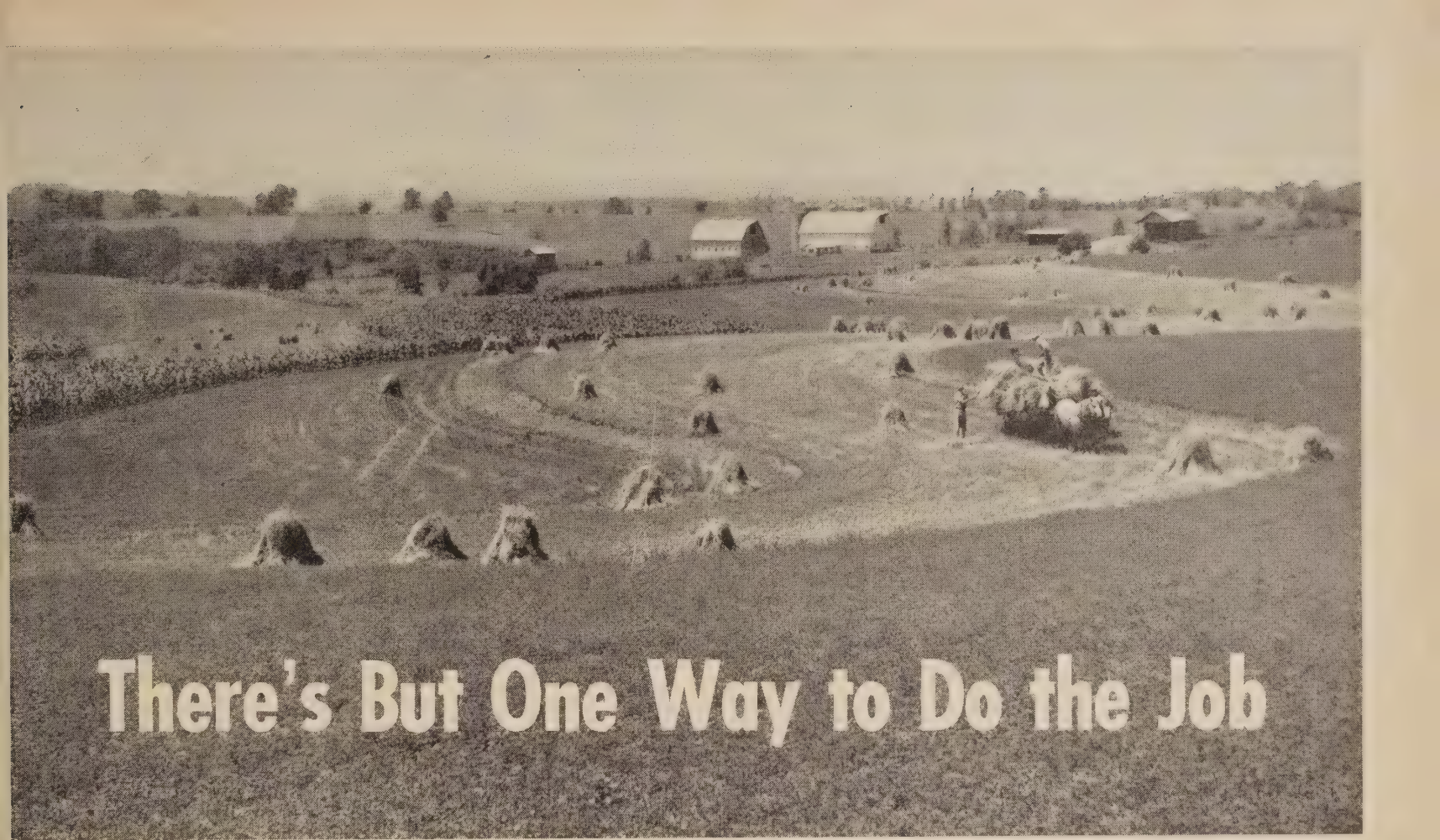
WELLINGTON BRINK EDITOR

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Front Cover: Christmas trees are a profitable crop on this farm in Columbia County, Pa. See page 144 for further comment.

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There's But One Way to Do the Job

By Hugh Bennett

Chief, Soil Conservation Service

I THINK it advisable at this time to have a look at our National Program of Soil Conservation. In this article we will briefly examine the meaning and purpose of soil conservation, and explain how it is being applied to the land.

Why Do We Need Soil Conservation? Throughout the world there is pressing need for better adjustment of agriculture to the physical environment—better use of land and water—not only to gain a sorely-needed increase in per-acre production but also to maintain a healthy agricultural economy—which could be disastrously undermined through continuing impairment of our limited supply of productive land.

This adjustment is vital, moreover, if we are to maintain in efficient production the most widely distributed and greatest possible area of productive land as a safeguard against physical difficulties and excessive costs in the distribution of agricultural commodities. This is especially true of those regions of dense population and inadequate transportation facilities—where so often not enough productive land is available to produce needed food.

And most imperative of all reasons: These necessary adjustments must be made if we are to maintain our ability to produce in any adequate way at all. Such essential changes call for the elimination of land-use practices haphazardly—and wastefully—applied to the land, and the widespread adoption, in their place, of various conservation practices scientifically fitted to the needs and physical characteristics of the land, the climate, and the type of farming.

These practices, applied in this way, will at once protect the land and increase its productivity by conserving the soil itself, its available elements of fertility and all that man and nature put into the soil, together with a valuable portion of the rainfall that would otherwise be lost as runoff. This is of primary importance because there is no other way by which the agricultural plant of the United States—or of the world—can be kept in a safe and permanently healthful condition necessary to support a permanent agriculture. And further, it is vitally necessary because it is the only way to get from the land anything like the sustained yields necessary to feed the world.

A New Agricultural Technique. Soil conservation as practiced by trained soil conservationists is a technique in land use and protection that was never previously employed in any general way anywhere. It is not only the cheapest¹ and most effective way of protecting farm land from destructive erosion, it is the only practical way to keep cultivated and grazing land permanently productive. Other methods, such as the old single-practice method of terracing, have failed to the extent of permitting millions of acres to be ruined for any further cultivation.²

Until this new system came on the scene, in 1933, in the form of the program of the Soil Conservation Service, our farm lands in the United States were being impoverished at a rapidly increasing pace. The extent of damage by erosion during the 40-year period from about 1890 to 1930 probably exceeded all previous damage to the farmlands of the country. But now, finally, with the aid of this new technique we are definitely turning the tide; we are winning the fight against the greatest enemy to productive land—uncontrolled soil erosion.

When we started the program, I scarcely expected to live long enough to witness the profound agricultural revolution that is now spreading throughout our country. I look upon it as the greatest agricultural achievement of all time, for without productive land there can be no adequately productive agriculture. Even now a third of the people of the world are hungry most of the time, and still greater numbers have inadequate diets.

National Program of Soil Conservation in the United States. Twelve years ago (September 19, 1933) the first comprehensive, scientific action effort in the world to achieve conservation of soil and water resources on a nation-wide scale was undertaken by the United States when the program of the Soil Conservation Service—then the Soil Erosion Service—got under way. From the beginning, one cardinal principle dominated and guided this program. Some called the principle idealistic and impracticable; others failed to grasp its significance; but farmers, after a brief period of convincing demonstration, very generally accepted it enthusiastically.

That basic, guiding principle was at the outset and is today as follows: *Effective prevention and control of soil erosion and adequate conservation of rainfall in a field, on a farm or ranch, over a watershed, or on any other unit or parcel of land, requires the use and treatment of all the various kinds of land comprising such areas in accordance with the individual needs and adaptabilities (or capabilities) of each different piece of land having any important extent.*

Like any precise statement of a rule, however, this principle requires some qualification.

First, the use and treatment of a given area of land must be determined not only by its physical

characteristics, but also, whenever possible, by such considerations as available facilities—implements, power, labor, financial means—as well as by the preference of the farmer, his ability to learn, his willingness to try new methods. In other words, the treatment must fit not only the needs and capacities of the land but the needs, adaptability, and preference of the farmer himself.

The second qualification of the general principle is that each distinct parcel of land to be treated must be considered in any pertinent physical relation it may have to any adjacent or neighboring tract, or to the entire farm, ranch, or watershed. Wherever possible, the use and treatment of one area should provide as much protection as may be practicable for adjoining or nearby areas. For example, the management of lands on higher elevations should take into consideration their relation to downslope lands. Outlets for surface runoff always should be located with proper regard to the effect of discharging water and water-transported soil material—sand, gravel, rocks, infertile material from contributory gullies—on adjoining lands, highways, or other areas susceptible to damage. Such water can do much damage along its course, as by cutting out gullies; or, it can be beneficially disposed of by safe discharge over pastures needing extra water.

To carry out such a completely coordinated soil and water conservation program on a nation-wide basis requires a great deal of basic information for the most efficient blueprinting (planning) of each farm for effective application of protective practices to the land. There are hundreds of different soils occupying varied slopes and subject to different intensities of rainfall and varying temperature. These numerous varieties of land, oc-

¹ The cost (as of Dec. 31, 1944) of doing the complete soil conservation job, including overhead, surveys, farm planning, and everything else, on 107,000 farms, comprising 30 million acres, in soil conservation districts, and the preparation and partial application of 149,000 additional farm plans, covering 41 million acres, plus the furnishing of certain machinery, planting stock, and seeds not obtainable in commercial nurseries, has amounted to \$1.28 per acre.

² Terraces properly constructed and maintained have helped where used alone on adaptable land—land of moderate slope and soil of low erodibility; but they have often harmed the land where improperly used. Technical guidance is absolutely essential to the use of terracing—as well as various other conservation measures—whether used alone or in combination with other measures.

curing under a wide range of climatic conditions, are adapted to a variety of plants, requiring different cultural practices. From place to place—even on the same farm—these varied land conditions and different uses and treatments result in varying susceptibilities to erosion and losses of rainfall. And both active erosion and erosion hazards call for special conservation provisions.

It is probably safe to say that no two parcels of land are identical. Accordingly, each field—even each important part of a field, pasture, or woodlot—requires its own particular conservation treatment. Our conservation specialists have found that in some localities each farm, each ranch, is a special problem within itself—calling for a special job due primarily to the physical environment. Hence, a special plan is made—must be made—for every farm of the nation.

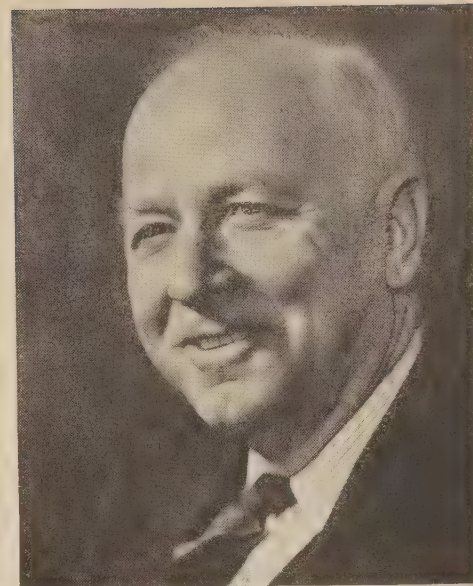
Tools of Soil Conservation. *Since soil conservation is the proper use and care of land, so that it will produce the greatest amounts of the products most needed, while, at the same time, protecting the land from loss of productivity, all measures that help keep land in condition favorable to sustained production are, therefore, tools of conservation. Terraces, contouring, organic matter, grass, legumes, shrubs, trees, crop rotations, fertilizer, drainage where the land is too wet, and irrigation where it is too dry—all of these and whatever else is needed are conservation tools that are utterly indispensable to getting the job of soil conservation properly done.* These tools are used singly where the land is easy to stabilize, and they are used in combination, one supplementing another, where the conservation needs are more complex.

In other words, soil conservation includes any and all measures that will in any way increase the productivity of the land or make the land keep on producing satisfactorily.

Some of the Land Troubles and Deficiencies That Soil Conservation Helps Prevent are:

1. Topsoil washing or blowing away;
2. Land torn to pieces by gullies;
3. Covering good land with infertile erosion debris;
4. Exhaustion of plant food in the soil by overcropping and leaching;
5. Accumulation of toxic salts;
6. Water-logging of the land;
7. Improper irrigation;
8. Burning of organic soils;
9. Excessive burning of grazing areas;
10. Improper cultivation;
11. Single-crop farming.

FIVE MAJOR BENEFITS



Hugh Bennett

WHERE it has been practiced, soil conservation farming has resulted in at least a 20-percent increase in production per acre, as an average.

It has provided a practical guide to greater crop diversification and has, as a matter of record, resulted in greater diversification.

It has meant savings to the farmer in seed, fertilizer, labor and power, and increased income.

It has accounted for a high degree of land protection, even under the pressure of intensified wartime production.

It has provided the farmer and ranchman with a practical, physical guide for shifts in the type or intensity of production that may become wise in the years ahead in order to meet possible changes in the price and demand for farm commodities.

—HUGH BENNETT.

Some of the Things That Soil Conservation Does are:

1. Holds soil and its contents of plant nutrients in fields, pastures, and woodlands;
2. Maintains or increases the supply of beneficial organic matter and organisms in the soil;
3. Keeps land productive;
4. Stores rainfall in the soil for crop use;
5. Increases diversification of crops;
6. Increases per-acre yields;
7. Makes cultivation easier and more efficient;
8. Reduces cost of operation and maintenance of farm machinery;
9. Increases farm income;
10. Reduces waste of rainfall and helps control floods;
11. Reduces the filling of stream channels, ditches, and reservoirs with the debris of erosion;
12. Reduces stream pollution;

13. Improves conditions for wildlife and fish;
14. Puts all land into productive use according to adaptability;
15. Develops habits of people working together on common problems;
16. Brings people to love the land and develops appreciation of rural life.

How the Job is Done. There are many things that can be done; some of them are as follows:

1. Use suitable erosion control practices and structures to stop soil washing and blowing;
2. Hold the rain that falls on the land for use of crops, trees, grass, livestock, or other purposes;
3. Use manure, fertilizer, and lime where needed, in the right amounts and at the right time;
4. Use suitable tillage, mulching, and cropping practices to protect the land and save rainfall;
5. Drain over-wet or water-logged fields;
6. Plant grass, shrubs, trees, or legumes on land too steep, shallow, or erodible to plow, also on land too poor for growing field crops;
7. Flood fields where toxic salts ("alkali") have accumulated in excessive amount, to leach out the salts;
8. Protect organic soils (peat land) from fire by flooding or by raising the water table;
9. Open up suitable new lands, where needed, under conservation methods, to increase cropland;
10. Increase supplementary feed crops on grazing enterprises to help prevent overgrazing.
11. Support conservation work with continuing program of research aimed at quickest possible solution of problems arising in connection with field work.

These and other sound farming and ranching practices that protect the land and increase production efficiency are, as previously pointed out, the tools of soil conservation.

Where the slope of fields is steeper than 8, 10, or 12 percent, or where depth to rock is less than a foot and to impervious clay less than 3 inches, the conservationist knows that the land is hardly ever safe for regular plowing. Grass, legumes, trees are better crops for land of this kind because they hold the soil in place. In regions of heavy rainfall, terraces to control runoff are built more sturdily than in areas of gentle rains. If yields drop off, if the forage of pastures becomes scant, the conservationist uses manure, lime, soil-building legumes, and appropriate mineral or other fertilizers to

A FEW MILESTONES

By July 1945, 45 states had passed district laws, and 1,328 districts had been set up. They cover parts or all of 1,771 counties and include 734 million acres and 3,404,000 farms.

By the end of 1944 soil conservation districts had made cooperative agreements with more than 256,000 farmers, covering 71 million acres. In each case the farmer agreed to use conservation farming on all his land. The district agreed to furnish technical aid, and in some cases machinery, seed, and other help. The Soil Conservation Service did the technical planning and helped apply the plans to the land. Various other agencies assisted in other ways. Work has been completed on nearly 30 million acres of this land. Counting demonstration projects, a total of 76 million acres has been treated.

In the one year, 1944, soil conservation practices were applied through soil conservation districts to 10,156,000 acres.

A lot of work has been done by the Soil Conservation Service *outside* of districts. Our technicians drew up plans for 9,320 widely-scattered demonstration farms, in cooperation with the Extension Service. They also made 104,000 other plans for demonstration areas and CCC camp areas and for erosion control on highways, and started a conservation program on military camp areas that led to the protection of about 300 sites, and so on.

Recently the Soil Conservation Service made a state-by-state survey to see how much conservation work remains to be done to control erosion and conserve rainfall. It shows that, in spite of what has already been done, a vast job still lies ahead.

We can get along from now on with the good land we have left, *but we can't keep our present standard of living if we lose much more*. We now have around 460 million acres of good cropland in the United States. This includes, besides that now in crops, about 100 million acres that need clearing, drainage, irrigation or other improvements. That's all we have. And all but about 72½ million of this 460 million acres is subject to erosion if it's not protected.

So we have no more land to lose. Actually we need more good land for crops now. Too many farmers in some sections are working poor land that should be turned back to grass or woodland. *More waste of good land would amount to a national crime* on the part of those who are responsible—meaning ourselves.

improve the productivity. He plants raw gullies to grass, trees, or vines; or, if these will not grow well, he may use small dams or other mechanical measures to stop soil washing. Critical spots in fields he safeguards with kudzu or other effective soil-building crops that better fit the situation. Wet spots call for tile drain or open ditches, ac-

cording to local conditions. Dry lands call for irrigation or water spreading. Acid lands need lime, while some alkaline lands will be benefited by additions of sulphur to correct alkalinity.

Who Does the Work? In order, then, to apply a complete program of conservation-farming methods to a farm—in its entirety—it is necessary to combine the techniques of all the pertinent branches of agricultural science, together with necessary engineering, hydrologic, biologic, geologic, botanical, chemical, and other skills.

A single farm may require contributions from soil and water conservationists, agronomists, hill-culturists, geologists, foresters, engineers, hydrologists, wildlife specialists, chemists, and others.

The soil conservation program has developed a new science as well as a new specialty—the *science of soil conservation* and the specialty of the *soil conservationist*. The former is what the name implies and the latter is a practical technician capable of recognizing the ordinary needs of land for conservation of soil and water, and who also has the ability to apply skillfully, scientifically, the various conservation techniques, singly or in combination, as needed.

There still will be needed, moreover, for efficient forward movement of the present national action program of soil and water conservation, a number of well trained specialists, such as agronomists, geologists, engineers, foresters, and hydrologists. These specialists are required to help keep soil conservationists, working directly with farmers, fully abreast of the latest developments in the various technical fields, and to help train personnel required to do a good job—duly coordinated to fit the different parcels of land that make up farms and watersheds.

Take away from this national program of soil conservation any one of these techniques or technicians and you thereby weaken the conservation effort of the nation. You impair the effectiveness of the work. You retard progress. You jeopardize the chances of controlling erosion. Today, by using all the needed techniques, technicians, and specialists we are absolutely controlling erosion on a widespread scale.

Occasionally, some people who do not understand very well the requirements for achieving effective and lasting work propose that agronomists should not work on the soil conservation job because they are agronomists. Once in a while, the same kind of people will suggest that engineers should not be used because they have been trained to do strictly engineering jobs. They sometimes advance the idea that foresters should not be used

because they have specialized in forestry in and out of college. If this kind of thinking should be followed—if you can't build terraces or plow on the contour because it's engineering, or plant grass because that's agronomic work, or plant trees or any other needed plant that grows on the earth because that kind of work would be forestry or something else—then there would be no practical way, no possibility of ever getting the job done.

If one skill is denied, why not deny the right to use other skills, technicians, or specialists, and so on, until you arrive at a point where nothing can be done?

You wouldn't think anyone would seriously consider such senseless emasculation of a highly successful going job, when it is pretty generally understood that the nation was a hundred years late in getting an effective national program under way—but ever so often, nevertheless, it still happens.

There is one way and only one way to do an effective job of soil conservation; and that way I have briefly described in this statement. This is not just a matter of opinion; it is a physical fact that has been unmistakably proved by far-reaching research and experience on the land.

So let's keep going in the positive direction I have indicated. Conditions for work—better transportation facilities, more and better equipment, additional manpower, and so on—will steadily improve from now on. Let's speed the work along!

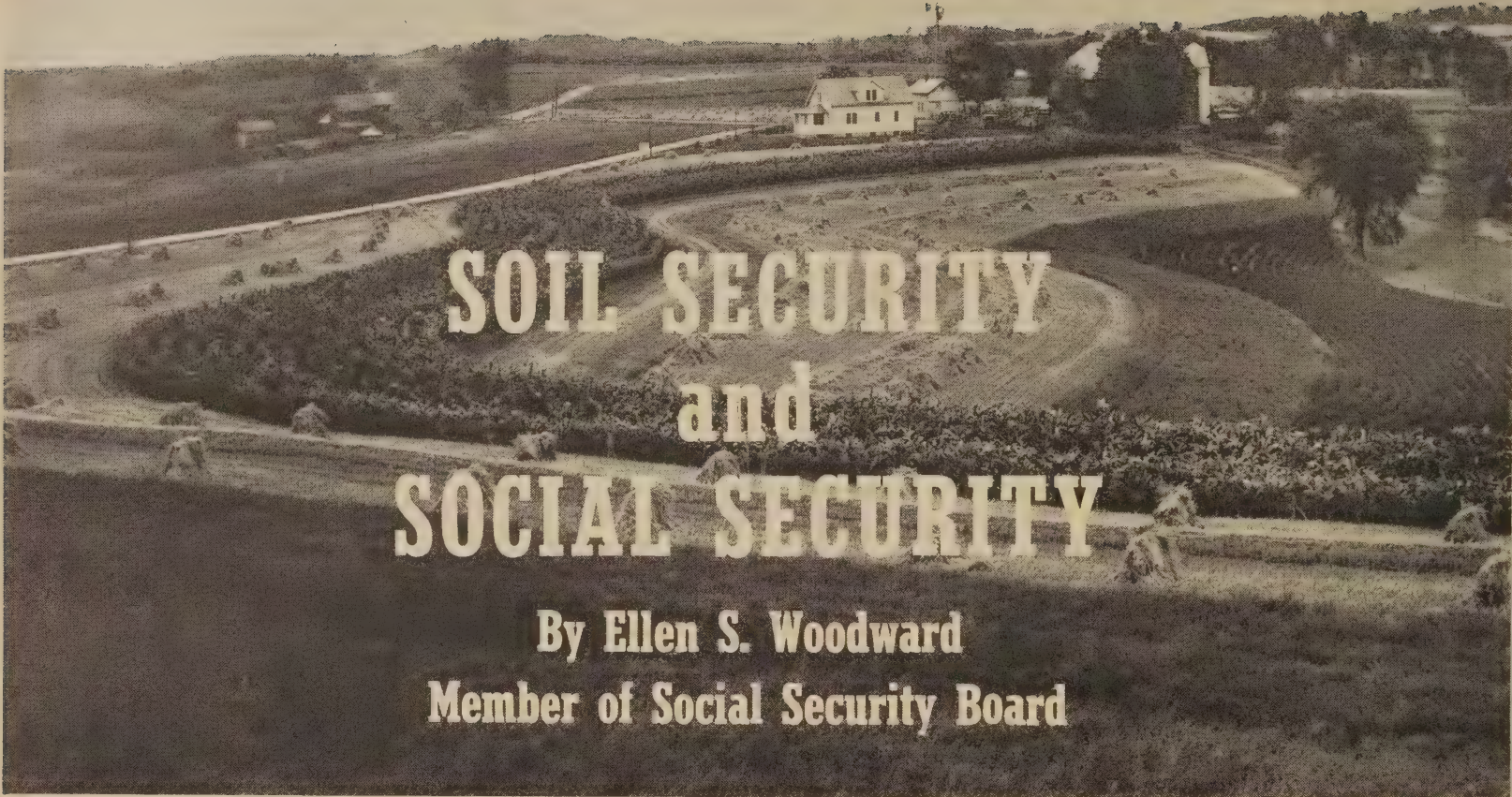
Next calendar year let's treat twice as much land as we have ever treated in a single year, without any impairment in the quality of our work! Let this be the goal of every person doing soil conservation work.

ONE DOLLAR BUYS THIS TOOL

Many conservation farmers who invest in terracing, lime, fertilizers, specialized machinery and good seed find that what they read in *Soil Conservation Magazine* helps them to use such purchases to better advantage. This periodical—official journal of the Soil Conservation Service—may be obtained at one dollar per year from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Use form below, if desired.

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SOIL SECURITY and SOCIAL SECURITY

By Ellen S. Woodward
Member of Social Security Board

Smiling lands support happy, prosperous people.

MEN and women and children are not detached from the world in which they live. They are products of their environment, part of the landscape to which they belong. Even in so-called "good times," where the soil is undernourished and wasting away we find vast numbers of people who are likewise undernourished and wasting away. If we would have a Nation of strong, healthy, happy citizens—a sound, effective social order—we must build literally "from the ground up."

In my many years of dealing with the effects of economic and social blight in our land, I have had ample opportunity to observe the human damage that has been done through depletion of our soils. I have seen its mark on homes, on schools, and along highways. Ragged farms support ragged people; thin soils, thin bodies; bare fields, unpainted towns; diminishing harvests, struggling merchants. I have seen children unable to get what they should from their teachers because they were suffering from hidden hunger—the lack of essential nutritional values in the soils that grow their food.

On the other hand, I have seen smiling, well clothed, healthy, happy folk living on smiling lands—lands protected and intelligently groomed

and put to the productive tasks for which they are best suited. I have noticed bounty actually increased by 20 percent or more from soil conservation measures. Soil conservation offers true security. The capital investment is insured. Homes hold together. The farm passes as a fine heritage from one generation to the next. Food, in variety and abundance, is always on the family table.

Human security comes not in a single small bundle, neatly wrapped. It comes from an alliance of forces—science, education, medicine, economics, government. Because of the close affinity between soil security and social security, I believe that it is well worth while for the readers of *Soil Conservation* to understand what the country is now trying to do to establish a bulwark against some of the greater economic and social strains.

Yes, human erosion goes hand in hand with soil erosion. During the early 1930's, the people who lived in the Dust Bowl became as pitiful as their land. As the grasses and plains withered, the people withered, too. They grew listless and weak; their farms fell into ruin, and distress spread. Finally, abandoning the land, families migrated to towns and cities; many to the Pacific Coast. They came penniless and destitute, and most of them had to ask for public relief and charity.

All this human misery, and all this waste, was a result, largely, of the inconsiderate spending of the wealth of the soil. Men's agricultural partitioning of the West ran counter to the dictates of nature, and ended inevitably in social frustration and economic loss. Even before the turn of the century, the Great Plains region had experienced severe dry spells, but such recurrent warnings went unheeded. It was only when the problem of drought, with all its fateful accompaniment of human distress, was brought forcibly to the attention of the Nation by a succession of devastating visitations in 1930, 1931, 1933, 1934 and 1936, that governmental resources were marshalled for a mass attack on the fundamental problems involved. Then, along with measures to ease the immediate distress, a long-range program of soil conservation was established to revitalize the earth.

During those years in the early 1930's when the people of the Dust Bowl were suffering from the devastation of the soil, people in all parts of the country, in cities as well as on farms, were suffering from a catastrophe as terrible as drought. For a depression had withered the economy of the land, and people were unemployed and hungry and with-

Mrs. Woodward, the author of this article, is the only woman on the powerful three-member Social Security Board. In this paper, specially prepared for *Soil Conservation Magazine*, she points out the sharp relationship between the welfare of the land and the welfare of the people who live on the land.



out hope. Human erosion took place on so vast and tragic a scale, that emergency measures had to be taken to alleviate the immediate suffering. There were bread lines to feed the hungry and emergency work projects for the unemployed.



Scant opportunity here, where the soil has worn threadbare.

But long-range measures were also started. For just as there is constant soil erosion year in and year out when the soil is unprotected, so under our hugely complex industrial society there is constant danger of human erosion, in good times as well as in bad. And just as we seek by various methods of soil conservation to provide moisture in the dry months and store or transport surplus water in the rainy periods, so also we are under obligation to give continuing attention to measures that will safeguard people during the critical economic seasons in their lives.

There are times in almost every human life, when economic disaster may strike. The breadwinner may lose his job and not find another for months. Or he may become sick and be unable to work. A costly illness may strike some member of his family and cripple him financially for years. Or the breadwinner, himself may lose the use of an arm or a leg and be permanently disabled for gainful employment. Old age may overtake him and render him too feeble to work. Or he may die while he is still young, and leave a widow with small children to bring up. Whether any of these conditions are brought on by drought or flood or war, or just by time and circumstance, they are periods when a family may need financial help.

People who are without protection against these major hazards, are subject not only to the dis-

asters, but to the constant and eroding fear of economic insecurity. They live with fear; it puts its mark on them, the way wind and rain devastate a land stripped of its protective covering of forest or grass. And the destruction spreads, for not only are the people made destitute, but they become burdens on the community as well, and their misfortune must be borne by all.

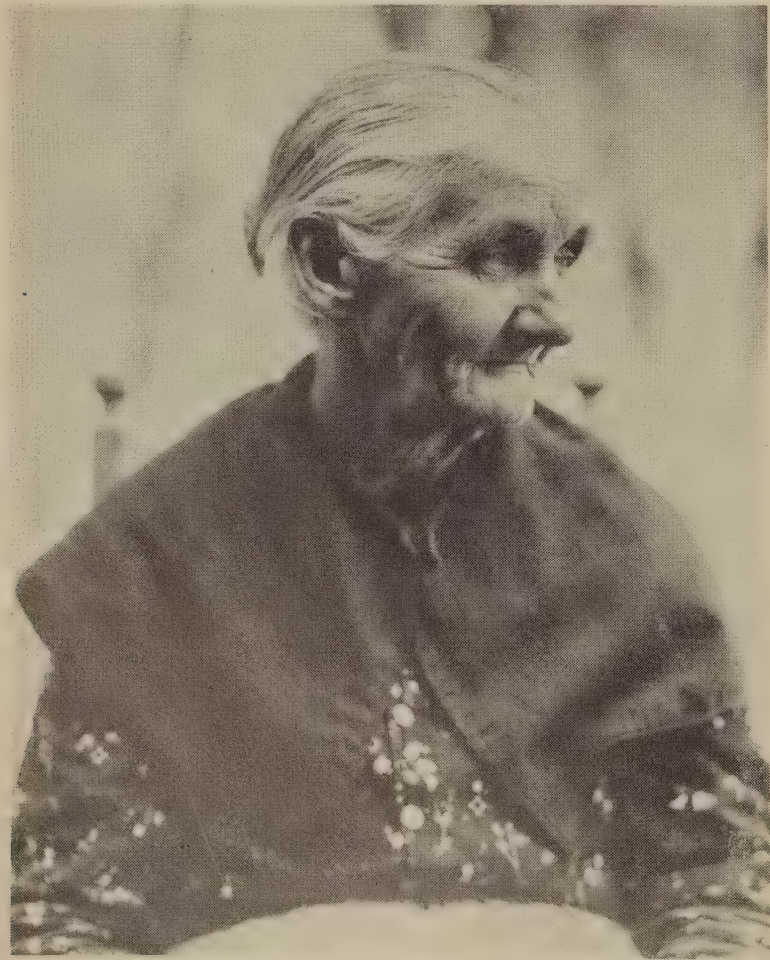
To wait until these disasters occur before trying to do something about them, is equivalent to waiting until a dust storm blows up before trying to improve the soil. Such lack of foresight not only increases the danger, but makes it more deadly when it strikes.

It was for these reasons that the Social Security Act of 1935 set up a three-fold program to provide some safeguards for the critical economic periods in human lives. Two of the programs, old-age and survivors insurance and unemployment compensation, are social insurance programs. They are based on the principle of spreading the economic risk, for though millions are subject to disaster, relatively few are stricken at any given time. Workers insured under these programs earn credits toward benefits while they are employed, and receive payments if and when the crises occur. The third program, called public assistance, is designed for those who are or have been unable to earn adequate insurance benefits, such as needy old people, the needy blind, and dependent children.

As yet, the benefits of only the public assistance program are available to farm people. Old-age and survivors insurance and unemployment compensation are designed mainly for workers in industry and commerce, and at present farm people generally are not included among the groups who can qualify for benefits.

The public assistance program has proved of great value to farm families and to communities in the drought area. Before the program was established, States and local communities had to rely solely on their own resources in providing aid to those in need. Under the Social Security Act, provision is made for grants-in-aid by the Federal Government to the States. These grants match State funds and the States administer the payments to those who qualify. In December 1936, about a year after the Social Security Act was passed, over \$200,000 a month in benefits of this kind were already being paid in the drought area. The Federal grants not only helped the needy aged, needy blind, and dependent children, but left more State funds available for use in general relief.

The social insurance programs have taken longer to get under way than the public assistance



Her work day done, security should be hers. (Photo, R. J. Nesmith and associate, Josephine Sharkey.)

program, since insured workers had to build up credits in order to qualify, but both are functioning widely today.

Old-age and survivors insurance is a Federal system, designed to protect wage and salary earners in industry and commerce by providing an income for the breadwinner when he becomes too old to work, and for his family when he dies. To help cover the cost of this protection, the worker at present pays one percent of his wages, and his employer matches that contribution. This money goes into a fund from which benefits are paid to those who qualify.

When a worker who has worked long enough and earned enough in covered jobs to qualify for benefits, reaches the age of 65 or older and retires, he receives monthly payments for the rest of his life. His wife also gets monthly payments when she is 65, and if he has young children, they too receive payments until they are 16, or 18 if they remain in school. Should the worker die even before he is 65, his widow and his young children, get monthly payments. If the worker had no young children, and if his widow is less than 65, she will get a lump-sum death payment and monthly payments will start when she is 65, provided she has not remarried. If a worker leaves neither widow or children, then his dependent parents are entitled to get payments if they are over 65.

The unemployment compensation program established under the Social Security Act is State-operated, and is designed to provide regular weekly payments for insured wage earners who temporarily are out of work through no fault of their own. These payments are for limited periods and are limited in amount. Each State has its own unemployment compensation law, and administers its own program, with the Federal Government paying the costs of administration.

These three programs, public assistance, old-age and survivors insurance, and unemployment compensation—were established just a decade ago, in the same year that the Soil Conservation Service was started. It has been a decade of great change and turmoil—of depression and war and now reconversion. Throughout the years, soil security and social security have played steadily greater roles.

War placed severe pressures upon the land and upon the people. Farmers worked the soil to its limits to provide food for our armed services and allies, as well as for our civilian population. This pressure will continue, for the land must continue to feed not only millions of Americans at home, but many starving peoples abroad. The conservation measures established during the past decade



Machines, men and soil can't go on forever. We need replacements for machines, conservation for soil, security for men. (Photo, Farm Security Administration).

have proved of untold value, and in the years ahead they must be continued, if the land is to meet the increasing demands upon it.

During the turbulent ten years since the Social Security Act was passed, millions of people have gained a new sense of security, never before possible. The old-age and survivors insurance program has saved homes, kept children with their mothers, given aged men and women regular income, strengthened the family, and kept children in school. It has given millions an incentive to save for a rainy day. Far from destroying ambition and drive, it has provided a basic minimum on which to build. Today, more than a million persons, including retired workers, their wives and children, and the widows and children of deceased workers, are receiving benefits totaling about \$20 million a month.

The unemployment compensation program has likewise contributed to the minimum basic security



It's a tough battle, and it takes tough men and women to win it. Soil security and social security are related objectives. (Photo, Federal Security Agency.)

of many workers during periods of unemployment. In the reconversion period through which we are now passing, millions of war workers who will be temporarily without jobs, will be able to bridge the gap with the help of unemployment compensation. Not only will these benefits serve to keep families going while the breadwinner hunts for a job; the benefits will also help to maintain purchasing power in the community, and this is the life-force of business.

The record of the past ten years has proved that the social security programs are based on good and workable principles. But that does not mean we have reached our goal of basic security for all—any more than the Soil Conservation Service has reached its goal of restoring, revitalizing and conserving all of our land. There is still much to be done—so very, very much.

First of all, not enough people are covered by social insurance. While some 43 million persons

earned some wage credits in 1944 under State unemployment compensation laws, only 36 million earned enough to qualify for benefits if they lose their jobs. Some 12 to 15 million workers, including many employed in small firms, farm workers, government employees, workers in non-profit institutions, maritime workers, and domestic employees, are not covered by State unemployment compensation laws.

Coverage under Federal old-age and survivors insurance is not broad enough, either. Some 70 million workers have earned credits counting toward this insurance, but only 40 million have earned enough to acquire insured status. About 20 million workers have no such protection, for they are in "non-covered" employment in which the wages do not count toward benefits. This employment consists chiefly of farm work, domestic service, government work, self-employment, and work for nonprofit organizations.

Farm people constitute one of the largest groups who are not protected. There are probably 5 to 5½ million farm operators and from 3½ to 4½ million paid farm workers in the United States. Like many other workers, they prospered during the war, but in 1940, census figures showed their incomes to be very low. In 1939, nearly half of our farm operators earned less than \$600 a year, including the value of the food consumed by the farm family. Two-thirds had an income of less than \$1,000. That same year saw 10,567 farm foreclosures, and even in 1943, when farmers were much more prosperous, there were 3,270 foreclosures.

Farm people have need for social insurance protection, just as do workers, in industry and commerce. Furthermore, many farm people work part time in jobs that are covered under the existing programs of social insurance. During these short periods of employment, they pay taxes toward old-age and survivors insurance benefits, yet most of them do not remain on the jobs long enough to build up insured status, and so will never qualify for benefits. To provide protection for farm operators and farm workers in old age, and for their families if the workers should die, the Social Security Board has recommended that old age and survivors insurance be extended to these groups.

The Social Security Board has also recommended that coverage under State unemployment compensation programs be extended to paid farm workers and other wage earners now excluded. Farm owners and operators, being self-employed, would not be included, since it is practically impossible to determine when a self-employed person is actually unemployed.

Providing protection for more people under the existing laws is just one of the improvements, though a major one, that can be made in our system of social security. There are many others. One of the Social Security Board's principal recommendations is that cash benefits be provided to replace partly the wages lost when a worker becomes sick or disabled. Our present system offers protection only against such hazards to earnings as unemployment, old age, and death. Yet sickness and disabling accidents can also cut off earnings. A man who cannot work for two months because he is sick, is often in worse financial position than the man who is laid off for two months. Yet our social insurance system provides unemployment insurance, but no sickness insurance. Similarly, a man who is unable to work because of old age, can get benefits. But if he is crippled permanently and cannot work, he gets no benefits, even though

his family is usually harder hit than the family of the man who has become too old to work.

The insurance principle can and should be carried even farther, to cover another great economic hazard, the cost of medical and hospital care. Millions of people go without needed medical care because they do not have the money to pay for it. A single costly operation can throw a family into debt for years. Yet if we are to provide basic security for all our people, the social security program must make it possible for all groups in the population to get whatever medical care they need. This means, too, that hospitals and medical clinics must be built in all regions of the country where existing facilities are inadequate.

Many farmers have learned through cooperative health plans of their own—and through the Farm Security Administration plans—of the great value of prepaying the costs of medical and hospital care through an insurance plan. The Social Security Board believes that more and better medical care would be available if the pre-payment through social insurance of the costs of medical and hospital care covered every person. It recommends that these and other risks be provided for through a national comprehensive system of social insurance with decentralized administration through local offices and representative advisory councils.

The depression years taught us bitter lessons. They taught us that we must conserve our land and our resources and protect them from waste and decay. They taught us that we must protect people too, from economic hazards that they are powerless to avoid. Soil conservation and social security have helped immeasurably to provide these protections.

But the war years just ended taught us even more significant lessons. They revealed to us the tremendous productivity of American industry and labor. They brought to light the amazing genius of modern scientists, culminating in the world-shaking release of atomic energy.

These facts are now part of the record. We know today that we have the material and the energy and the know-how to produce enough so that no man and his family need go hungry or ill-housed or ill-clad. The challenge of the future, which we now face, is to insure the well-being of our people. How successfully it is met depends upon the wisdom with which we use our vast power and resources, to bring lasting peace and security to all. The land and the people and the future will return what we plant now. But we must build safeguards against drought and disaster, so that the harvest will be good.



He Keeps His Farm in Sod

By N. E. Rowley

Fine saddle horses on the Jackson farm. There's still some pasture improvement to be done in this field.

RALPH Jackson was told that he couldn't make a decent living out on the prairie northwest of Pryor, Okla. The land was "no good," it was sand and Jackson was wasting time and money trying to produce anything on the 80-acre farm he bought for \$800. That was 1937.

Since that time the skeptics have been silenced, rather thoroughly, by what Jackson has done on the farm in cooperation with the Mayes County Soil Conservation District. Conservation farming now has the income from his dairy cows alone bettering \$450 a month.

Jackson knew when he moved to the 80-acre place that he couldn't make a living if he tried to cultivate the crusty prairie soils. He figured, with technicians of the Soil Conservation Service assigned to the Mayes County district, that a pasture-dairy farm ought to make the best use of his acres and return the largest income.

When Jackson bought the place only 16 acres had been broken out and the remainder was poor weed pasture with very little grass left. But today everything is in pasture and pasture crops with the exception of 5 acres in orchard, 5 acres in ponds and one acre in garden. The change in land use from cultivation to pasture was the very heart of the plan for the whole farm which Jackson

worked out in cooperation with the soil conservation district.

One 45-acre pasture—sodded with Bermuda and seeded to lespedeza, rye and native grass—Jackson calls it his Big Pasture—carries his 32 dairy cows most of the time. Jackson uses it in combination with a 16-acre supplemental pasture of sweet clover, red top and lespedeza, and with 4 small pastures on which he grows ryegrass, red top and native grasses.

The pasture on the entire place has been growing and improving for eight years. According to Jackson, each year it gets better. "One of the beauties of my pasture program is that the grasses in it can take advantage of any kind of weather. This year has been exceptionally wet, and my lespedeza has really gone to town. The Bermuda is doing all right, too. If the year happened to be dry, the Bermuda would have done a large part of the feeding job which the lespedeza is doing," says Jackson. He points out that his cows produced a little more milk in July and August this year than in May and June. "The pasture just keeps on getting better," he states, and a look at his Big Pasture shows the cows aren't able to keep it eaten down.

Lespedeza likes Jackson's land. His front yard, about one-fourth acre, shows rank growth. Jackson plans to cut it for hay soon.

NOTE.—The author is assistant state conservationist, Soil Conservation Service, Fort Worth, Texas.

Feed bills for his farm were \$1,500 last year, Jackson states. That amount, and the pasture he grows on his 80 acres, fed 64 head of livestock, including 32 milk cows, 15 heifers, 5 hogs and 6 horses he is raising for saddle stock. "My cattle have done better—they are in better shape—this year than they have ever been," asserted Jackson.

Last year he milked 12 to 14 cows throughout the year, selling \$1,900 worth of milk. His pastures seem fairly stable this year—one month's income is about like the next. Jackson says his milk check has varied upward only a few dollars from an exact \$450 since early spring.

Total 1944 income on this farm which the feed-box experts said wouldn't pay was \$6,500. Receipts included \$1,000 from hogs, \$1,000 from cows, \$800 from eggs and \$200 from chickens. He has a flock of 200 Austrawhite chickens which has produced at least 60 eggs daily all year.

Jackson's two fish ponds, covering five acres, are designed to furnish irrigation water for his orchard, although he has yet to complete the ditches to carry the water to the trees. He expects to do that within the next year or so. Currently he is more than satisfied with the water the ponds furnish his cattle and with the more than 400 pounds of fish produced each year.

His fertilized pastures all drain into the ponds. This in turn fertilizes the ponds so that the fish make good growth. He stocked the ponds in 1939 with bass, perch and channel catfish. He hasn't had to restock. "I've caught 16-pound buffalo and four to five-pound bass out of there," he says. Usually Jackson can't seem to find the time to fish the pond enough to remove the

large fish so the small ones have a chance to grow, although he and his neighbors try hard.

His wife proudly shows the last few jars of more than 90 pints of fish which she canned last year. "We have a grand time when we harvest the pond," she says. "The neighbors all come in and we have more fish than we can eat."

The plum orchard on Jackson's place is only average. This year, generally regarded as a poor one for fruit in this section, he has received \$36 from sale of plums. In addition, the family ate a quantity of them and Mrs. Jackson canned many more.

Jackson maintains a machine shop where he does his own work and some for his neighbors. He intends to build a separate shed for his machine work this winter, since he needs the space in his garage which his tools now occupy.

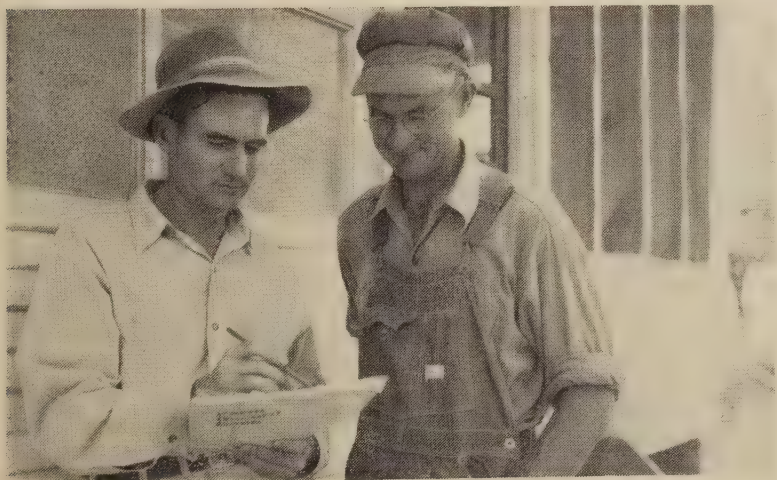
The Jackson home, a large, airy place built over a cool basement to which the family retires when



Jackson's cattle graze the recently-mowed pasture. Mowing controls weed competition with the better grasses.



This fine barn which Jackson designed and helped build is one of the fruits of handling each acre according to its capability. Milking room is in the left wing.



H. B. Roy, work unit conservationist, goes over a problem with Ralph Jackson, a district cooperator.

summer temperatures rise, is an excellent example of the fruits of conservation farming. It has modern conveniences and contains a number of useful fixtures which Jackson himself designed and built. The farm buildings include a large barn which his neighbors declare is one of the best in the community, a double garage and a chickenhouse.

Jackson doesn't confine himself entirely to his 80-acre place. For the past several years he has been renting 420 acres, 280 of which have been in

(Continued on page 142)

The Fenlands of England

By W. E. Doran



England's fens have played an important part in wartime food production. Thousands of derelict acres have been reclaimed. Here is a typical "duckpond" in which potatoes have replaced marsh.

THE fenlands of East Anglin have played an important part in wartime food production.

In the interval between World Wars I and II some of the fen areas had become derelict, due in part to drainage troubles and in part to the agricultural depression. Today all that is changed and thousands of acres of fen, derelict before the war and covered with scrub, reeds and bushes, or waterlogged because of defective drainage, have been cleared, drained and ploughed up. Hundreds of miles of concrete roads have been laid to give access to areas which formerly could only have been reached over soft peat "droves" impassable for wheeled vehicles in winter and very rough going even in summer. Sugar beet, potatoes, carrots and grain crops are all produced in abundance by the fertile fen soil.

In this great work of wartime food production American tractors and agricultural machinery have played a great part, and have enabled the utmost to be obtained from the land notwithstanding acute shortage of manpower. Great is the gratitude of Britain's agriculture to America, and

nowhere greater than in the wide acres of the fens.

Lying inland from the quadrilateral-shaped inlet of the sea known as The Wash on the eastern coast of Britain, bounded on the north by Lincolnshire and the south by Norfolk, lie the fenlands of East Anglia, an area more akin to Holland on the opposite side of the North Sea than to any part of England. Originally marshlands, the fen country, like the Dutch lowlands, has been reclaimed by centuries of determined struggle against nature and now includes some of the most fertile land in Britain.

The Wash is a natural settling basin for great quantities of fine glacial silt deposited there by the action of the tidal currents. In very ancient times the sea penetrated much farther inland than it now does, but over a long period of time the action of the tides built up a low coastal barrier of silt behind which lay a great freshwater marsh in which flourished peat-forming mosses.

Today the greater part of the fen soil is composed of rich black peat.

Here and there in the great marsh were islands of clay protruding above the general level.

NOTE.—The author is chief engineer to Britain's River Great Ouse Catchment Board. (The River Great Ouse is the main river of the English Fen Country, which lies on the southeast coast.)

Such sites, away from the haunts of men, attracted the religious orders, and the abbeys of Ely, Ramsey and Crowland were founded on island sites. Even today the administrative county in which Ely is situated is called the "Isle of Ely" although it ceased to be an island many centuries ago.

The earliest attempts at drainage were carried

out on a limited scale by the monks but it was not until the third decade of the seventeenth century that a comprehensive drainage scheme was attempted. At that time the wealthy and influential Francis, fourth Earl of Bedford, was persuaded to undertake the task. Together with thirteen other participants, he undertook to drain the fens in

Flood waters in the English fen country (Labenheath Lode) held by a precarious line of bags. Spillwater can be seen behind the bank.



consideration of a grant of 90,000 acres of the reclaimed land.

To direct the project he engaged the services of a Dutch engineer, Sir Cornelius Vermuyden, who had already carried out considerable drainage works elsewhere in Britain. Vermuyden set about the task with energy and skill, but difficulties of all kinds beset the work from the outset, including the civil war between Royalist and Roundhead, during which the work was suspended.

More than 20 years elapsed before the works were declared completed. During this period a vast work of drainage had been accomplished in spite of every difficulty and in the teeth of violent opposition from the unruly fenmen. Great new drains had been made and the meandering fen rivers had been confined between flood banks while new straight cuts had been executed where necessary. In the case of the main River Ouse, for example, the old course from Earith to Denver, which swung in a great arc eastwards, had been shortened by 12 miles by the construction of two parallel channels 21 miles in length.

Although three hundred years have passed since they were planned and executed, Vermuyden's work remain today very much as he planned them. Even with modern excavating machinery and the modern engineer's knowledge of hydraulics, these works would have been no small undertaking as a government scheme, but when one considers that nearly half a million acres of land were drained entirely by private enterprise under every kind of difficulty, both financial and political, and without the help of even the simplest machinery, one must marvel at the courage, tenacity and skill which brought the great work to a successful conclusion.

Further difficulties became apparent almost as soon as the work was considered to be finished. The drainage of the spongy peat soil caused the surface of the fens to sink—a process which has continued to the present day. Before long the time came when the water could no longer drain away by gravity and windmills were employed to lift it into the main watercourses.

The introduction of the windmill marked the beginning of the separation of fenland drainage into high level and low level systems. Originally the general level of the fenlands was about 5 feet above that of the coastal silt belt; today the fens average about mean sea level or 10 feet below the level of the coastal silt land.

The lowering of the peat surface, which of course the original drainers had not foreseen, is the basic cause of present day difficulties with fen

drainage. The fens rapidly became a depressed basin between the high land up-country on the one hand, and the coastal silt belt on the other. This basin, some 1300 square miles in extent receives the drainage from an area of higher land some four times greater, and through it have to pass the highland waters on their way to the sea. The highland rivers are carried through the fens in embanked channels, the normal level of the rivers being 6 feet or more above the level of the fens. Drainage of the fens themselves is done by pumping stations. The largest of these—which is in fact one of the world's largest, having a capacity of 3000 tons of water per minute—was completed in 1934 to drain the Middle Level fen extending over some 180,000 acres. The old windmills have long since ceased to function although one or two examples still survive. Windmills were replaced by steam engines and paddle wheels about a century ago, and these in turn were replaced by diesel engines driving centrifugal pumps. Nevertheless, in the heavy floods of 1937 and 1939, some of the old steam engines were again in action, and one built in 1831 had 165 running hours to its credit in the floods of 1937.

When heavy winter rains swell the upland rivers the water, pouring into the flat fen country, rises against the flood banks and the fenmen get ready to fight the floods.

In times past banks have given way or have been overtopped, and thousands of acres of fertile farm land have disappeared, for a time, beneath the waters. In 1937, and again in 1939, the floods rose above the level of the tops of the levees for many a mile and were only prevented from spilling over by a precarious wall of bags filled with peat feverishly built against the rising water by men working day and night without pause.

Bank failures have occurred by water seeping through and carrying away the toe of the bank. In other cases the bank top has been washed away.

The Land Drainage Act of 1930 marks an important point in the history of the fens. Under this Act river authorities called Catchment Boards were set up by the Government to control the principal rivers of England, and to enable the necessary improvement works to be done. Government grants, amounting in certain cases to as much as 75 percent of the cost of the works, were made available.

The Board principally concerned with the fen river system is the River Great Ouse Catchment Board which has under its jurisdiction an area of

(Continued on page 142)

This Landlord-Tenant Contract Works for Conservation

By Gordon Webb

FIVE years ago the Southern Piedmont Conservation Experiment Station at Watkinsville, Ga., set up a 100-acre farm to test the practical application of experimental findings. The farm is doing that. But something else of value to other landowners and tenants has come from this farm. It's a long-term contract that has made money for both landlord and tenant, and has been good for the land.

In this case, a government agency is the landlord. Raymond Dawson is the tenant. But substitute any Southern landowner for the station as landlord and any other hard-working fellow for Dawson as operator, and this five-year agreement with a few changes should work well almost anywhere else.

These dairy cattle grazing lespedeza sericea are jointly owned by farmer and landlord. Costs and sales are divided fifty-fifty.



Raymond Dawson finds the stalks tall and the ears heavy.

NOTE.—The author is head, current information section, regional division of information, Southeastern Region, Soil Conservation Service, Spartanburg, S. C. The Southern Piedmont Conservation Experiment Station is a cooperative soil and water conservation experiment station, conducted jointly by the Soil Conservation Service and the Georgia Agricultural Experiment Station.



This contract provides for full protection, improvement, and wise use of all the land on the farm. That's essential because both owner and operator must look to the land for the crops and products that give each an income. It lets the operator share in the long-time benefits of soil conservation. It encourages diversification. It enables the tenant to use his labor the year-around on the farm, and to have year-around income. It has given the owner a reasonably high year-after-year return on his investment.

The station has received from 4.7 to 9.6 percent interest a year on its investment of about \$5,900 in land, buildings, livestock, and equipment. Dawson has netted almost \$100 a month, with a lot of plusses in the form of milk, butter, eggs, fruits, vegetables, 800 pounds of liveweight pork a year, fuel-wood, and a good house in which to live.

And the land grows more cotton, corn, wheat, and oats to the acre. There's more hay. The pastures are better. As B. H. Hendrickson, project supervisor, puts it, "Even the weeds grow a lot better."

These and other benefits for owner and operator become apparent as we talk to Hendrickson, to John R. Carreker, who looks after the 100-acre farm, and to Dawson himself.

"The most important conservation facts have been developed on small experimental run-off plots," Hendrickson concedes. "But some of the practices might not be so good on fields, or maybe won't work out well in field practice. We need typical Southern Piedmont test farms to help us eliminate the 'bugs' in practical application of methods developed by research.

"You will notice that this farm began to make progress when the three fundamental needs were supplied. The run-off water was controlled, the soil loss practically stopped, and the fertility gradually increased, on a pay-as-you-go plan."

The hundred acres were chosen for a two-mule, one-man, cotton, corn, small grain, lespedeza, and livestock farm—a proving ground for land use practices.

About that time Raymond Dawson was moving from the nearby farm he had been renting. That farm was being sold. Dawson wanted to stay in the same community, and he decided to rent the experiment station farm unit. A five-year contract was entered into by him and the experiment station.

Now that the contract is nearing its end, station officials and Dawson alike agree that it has worked well for both parties concerned.

This contract, which does not constitute a partnership, goes beyond the production of the usual field crops of cotton, corn, hay, and small grain. It provides for livestock production with landlord and tenant equal owners of livestock and poultry. There can be no argument about "which calf is mine and which is yours." Every animal and every chicken is owned fifty-fifty.

Beef cattle were bought initially by Dawson and the Station. But when the University of Georgia began purchasing ungraded milk for manufacturing last year, the beef cattle were sold and dairy cattle substituted.

Dawson takes care of the livestock and poultry. All costs and all cash from sales are divided equally. All of the feed is grown on the farm except mash for the poultry.

The livestock enterprise is important for several reasons. The South needs more livestock to balance its agriculture, and this is especially true of tenant-operated farms. Livestock fits into soil conservation farming. With livestock, a farmer can market the grasses and hays from improved pastures and meadows planted for erosion control and good land use, as well as the small grain and annual hays grown in the soil conservation crop rotation. Livestock, particularly dairy cattle, helps to provide year-around use of farm labor, and brings in year-around income.

Last year total sales from the farm amounted to \$3,007. Livestock and poultry produced 51 cents of every dollar of sales, cotton 40 cents, and other crops 9 cents. Total costs of farm production were \$1,481.

This year, with a dairy herd, livestock products probably will account for a larger part of each dollar of sales. Gross income from the 6-cow dairy herd has been averaging \$31 to \$32 a week.

On July 1, the farm already had made a \$500 profit from 1945 operations. Chickens, eggs, milk, and 113 bushels of wheat made this possible. At that time, crops were about ready to lay by, and there would be few other expenses for crop production. The income from cotton and six more months of milk, eggs, and chickens was still ahead. That's what diversification, soil conservation, and a good landlord-tenant contract mean on this 100-acre farm.

Income from crops also is divided equally, but not all costs of crop production are. Some special arrangements have been made that would not apply on privately owned farms. For example, there's the \$382 cost of commercial fertilizer for last year's crops. Hendrickson said that ordinarily this cost would have been split equally between



John R. Carreker, left, of the experiment station, talks over cotton prospects with Raymond Dawson, farm operator.



Crotalaria volunteers after the corn is laid by. Billy, 14 year old of the Dawson household, shows how much the crotalaria had grown by mid-August.

tenant and landlord, but that the government agreed to pay the whole bill in exchange for the detailed records Dawson was asked to keep for the experiment station. The station also paid for insecticides.

Shorn of legal terms, the other parts of the contract are these:

Dawson agreed to live on the farm and to operate it in strict compliance with the soil conservation cropping plan given him by the landlord. This cropping plan provides for: 1. the growing of seed for all major crops to be produced, 2. the growing of all feed possible for livestock and poultry, and 3. the growing of crops for sale. The station built the terraces, but the tenant maintains them. (We'll have more to say about the soil conservation plan, including crop rotations, later.)

Two mules, a wagon, horse-drawn farm equipment and hand tools needed for plowing, planting, cultivating, and harvesting crops and for general upkeep of the farm are provided by the station. Veterinary fees and cost of medicines for the mules are paid by landlord. Repair parts and skilled labor when required for repairing equipment also are supplied by the owner. Dawson keeps in good repair the equipment, roads, trails, buildings, fences, gates, terraces, and other structures.

The station supplies the materials and the skilled labor for repairing buildings, and for new buildings. If a carpenter is needed, the landlord pays him. But Dawson works with the carpenter. Most of the lumber used in repairs, comes from the farm woodland. Dawson cuts the logs, hauls them to the sawmill, and hauls the lumber back to the farm. Sawmill expenses are paid by the owner, and when new fences are built he supplies one-half of the labor and Dawson the other half.

Dawson also furnishes labor for brushing off, plowing, seeding, fertilizing, and mowing needed to make new pastures or to improve old ones.

He agrees to protect woodlands from grazing, and all land from fire. The woodland management plan is followed in cutting trees for fuelwood.

Any special seed or plants not available or not grown on the farm are supplied by the owner, except for the garden. Dawson also buys the fertilizer used in the garden.

If equipment not on the farm is needed, the custom rate charged for the use of this machinery, is equally divided. A tractor and a combine, for example, are hired to harvest small grain and legume seed crops.

Carreker outlined the soil conservation farming plan. It is similar to plans farmers throughout the South are making with help from their soil con-

servation districts. Each field is used for the crops it will grow best, whether these crops are cotton, corn, small grain, sericea lespedeza, kudzu, trees, or grasses and clovers.

On the 8.2 acres of Class I land corn is grown each year with volunteer crotalaria for soil building. Class I land is the best we have.

On the 18.6 acres of Class II land, which needs moderate use of soil conservation practices, a two-year rotation is used. Oats grain overseeded with Kobe lespedeza is followed by cotton or corn.

On the 22.4 acres of Class III land, which needs intensive soil conservation practices, a three-year rotation is used. Wheat and lespedeza are grown two years, and cotton the third year.

The land in Classes I, II and III is terraced and farmed on the contour.

"These rotations have several advantages," Carreker explains. "Each year of row crops follows a summer legume residue. This permits land preparation in the winter. Corn and oats are concentrated on the best land where they yield the most. Cotton and wheat which give relatively better yields on less fertile land are on Class III areas. Small grain can be planted between the rows of cotton and corn in September, thus getting the grain in early enough for winter grazing. The rotations are easy to remember. You might say we have a one-year rotation on Class I land, a two-year rotation on Class II land, and a three-year rotation on Class III land."

The same amounts of fertilizers are used on the same crops on all land classes: 300 pounds of 6-8-6 in the row and 150 pounds of nitrate of soda side dressed on the corn; 500 pounds of 6-8-6 and 100 pounds of nitrate of soda dressed on the cotton; 400 pounds of 4-10-6 and 100 pounds of nitrate of soda on oats and on wheat.

The 19.9 acres of Class IV land should be used only occasionally for row crops. This land is planted to kudzu and sericea lespedeza for hay and grazing.

We found Dawson, his wife, and Billy, their 14-year-old son, dressing fryers and culled hens which were sold to an Athens store for \$43.35. Dawson likes the soil conservation farming plan and the rental contract. His wife likes the house, with running water, and the variety of home grown foods the farm provides.

Would Dawson want to renew the contract for another five years?

"I'd like to renew it," he replies. "But I'll need more land. This 14-year-old boy is helping me more all the time, and in a few years the 9-year-old twin boys will be working. I'll have more labor."

THE FENLANDS OF ENGLAND

(Continued from page 138)

3,200 square miles. Under its direction and that of its predecessor, the Ouse Drainage Board, an amount of about \$2,580,000 has been approved for the improvement of the fenland rivers since 1927, apart from the very large sums expended on pumping stations and internal drainage systems by local drainage boards, during the years 1921-1944, while shortly after the outbreak of World War II, the Board approved a flood protection project estimated to cost \$8,800,000 for the elimination of the fenflood danger; work which it is hoped will be embarked upon as soon as possible after the war.

Works such as these are carried out as grant-aided schemes under the Ministry of Agriculture and Fisheries. The work done so far has consisted mainly in raising and strengthening the existing flood banks with clay. The stage has now been reached where further heightening of the levees is no longer practicable and the flood protection project just mentioned includes the cutting of a new flood relief channel, 9 miles long, and with a bed width of 150 feet, which will reduce flood levels to below the safety line. The continual raising of the fen river levees has been necessitated mainly by the steady lowering of the surface of the peat fens. This sinking is a complex phenomenon due partly to the consolidation of the peat by improved drainage and pumping, partly to the dissolution of the peat by bacterial action, and to a great extent to aerial erosion. During the high winds of early spring great "blows" sometimes occur when the light peat soil, rendered powdery and friable by agricultural operations, blows away in great clouds. Drains are filled up in a few hours and many a farmer has seen three successive sowings disappear before the wind in a bad season. This problem, only too familiar in the American "dust bowl," is now being studied in the fens.

KEEPS FARM IN SOD

(Continued from page 135)

cultivation. He keeps separate accounts on his own land and that which he rents. "I'm cutting down," he says. "I have about 350 acres too many. I plan to get all my land and the land I rent into year-round pasture; to get away from cultivated crops and to grow legumes and ryegrass. I can put lespedeza up for hay, cut my feed bills, and work less with an all-pasture program. Cultivating a farm here doesn't pay me."

Long-Time Planning Of One Soil Conservation District

THE Broad River Soil Conservation District, including eight Georgia counties in the Piedmont hill section, found among other things that much land which was being farmed there was not suitable for cropping. It also found 150,000 acres of idle land in the district. Some of this idle land was suitable for crops; most of the rest was good for pasture, meadow, or woodland. The district's program now calls for changes in the use of this misfit and idle land. Here are some of the land use changes the supervisors of the Broad River District plan to make:

Cultivated land at time of planning	473,502 acres
Recommended for continued cultivation	369,333 acres
To be taken out of cultivation.....	104,169 acres
Recommended for kudzu and lespedeza sericea	47,350 acres
Recommended for permanent pasture	52,085 "
Recommended for woodland ...	2,367 "
Recommended for wildlife areas.	2,367 "
	104,169 "
Idle land at time of planning.....	150,000 acres
Recommended for cultivation...	30,000 acres
Recommended for kudzu and lespedeza sericea	67,500 "
Recommended for permanent pasture	24,000 "
Recommended for woodland ...	24,000 "
Recommended for wildlife areas	4,500 "
	150,000 "

When these changes have been made, there will be 75,000 acres less cultivated land in the Broad River District, but the district will have 217,000 acres more pasture, woodland, and meadow. The land left in crops will be the best land and with conservation farming it will produce more per acre. This will be partly because it is the best land, and partly because it is used properly, and more often rainfall is conserved.

The Broad River District had completed plans on 1,633 farms by April 1944. These farms made up about 19 percent of the total land area of the district. The figures below show some of the changes in land use that are being made on these 1,633 farms.

	Before Planning (Acres)	After Planning (Acres)	Change (Acres)
Cultivated land ..	99,920	91,557	8,343 less
Permanent Hay ..	1,074	18,381	17,307 more
Pasture or Range.	19,167	32,039	12,872 more
Woodland	61,206	68,262	7,056 more
Idle Land	17,548	0	17,548 less

These farms are reducing the area of cultivated land by 8,000 acres. But they are gaining 37,000 acres of permanent hay, pasture, and woodland. Every acre of idle land has been put to work. These are the kinds of land use changes that are being made in soil conservation districts throughout the country. They are changes that eliminate misfits and put the land to those uses for which it is suited.

The supervisors of the Broad River District have also determined through their planning what equipment, materials, and labor are needed to do the District job. Here are their figures for four big conservation work jobs.

The Job	Size of the Job	Needed:
Terracing	360,000 acres	360,000 horse hours 972,000 motor hours 3,132,000 man hours
Pasture Improvement..	228,000 acres	4,962,000 horse hours 3,360,000 man hours 6,740,000 lbs. of seed 228,000 tons of lime 57,000 tons of super-phosphate
Stock Water and Fish Ponds...	1,200 ponds	30,000 horse hours 30,000 tractor hours 180,000 man hours 60,000 ft. of pipe 1,600,000 fish
Farm Drainage ..	8,000 acres	80,000 horse hours 8,000 tractor hours 412,000 man hours 1,680,000 ft. of tile 16,000 cu. yds. of concrete

Farmers in 1,300 odd districts throughout the country—like those in Broad River—are going ahead with their day-to-day task of conserving the soil, but they are not fooled as to the size of the conservation program. They know there is a lot of work to do, but a highly encouraging thing is that this does not scare them. On the contrary, the challenge to save the soil or perish, plus the fact that they now know how, spurs them to action.

REFERENCE LIST

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SOIL CONSERVATION SERVICE

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CHRISTMAS TREES PAY OFF

When Andrew Abraczinskas—see front cover—started growing Christmas trees on his 900-acre farm near Catawissa in Columbia County, Pa., he didn't realize that this new "side line" of his would soon become his principal crop. Today he harvests thousands of Christmas trees every year. He sells them mostly on a wholesale basis and his buyers come and get the trees and beg for more; he doesn't have to worry about getting his crop to market.

Abraczinskas grows his trees on land that cost an average of less than \$10 per acre, and he can begin to harvest a planting within 6 to 8 years. Planting is begun by using a subsoiler dragged along the contour by a tractor; the trees are then set by hand, using no tools, and the loose earth is tamped down by stamping with the feet. This means that unskilled labor can be used to plant as many as 1,500 trees a day.

Christmas trees are a ten million dollar a year business and Christmas tree farming is becoming more and more popular every year. The trees grow well on land that is often not suitable for the usual agricultural crops, and they protect rough, worn or steep land from erosion.



In this issue

A Problem of "Antler Room"

**By Paul M. Scheffer and
Richard M. Bond**



JANUARY 1946

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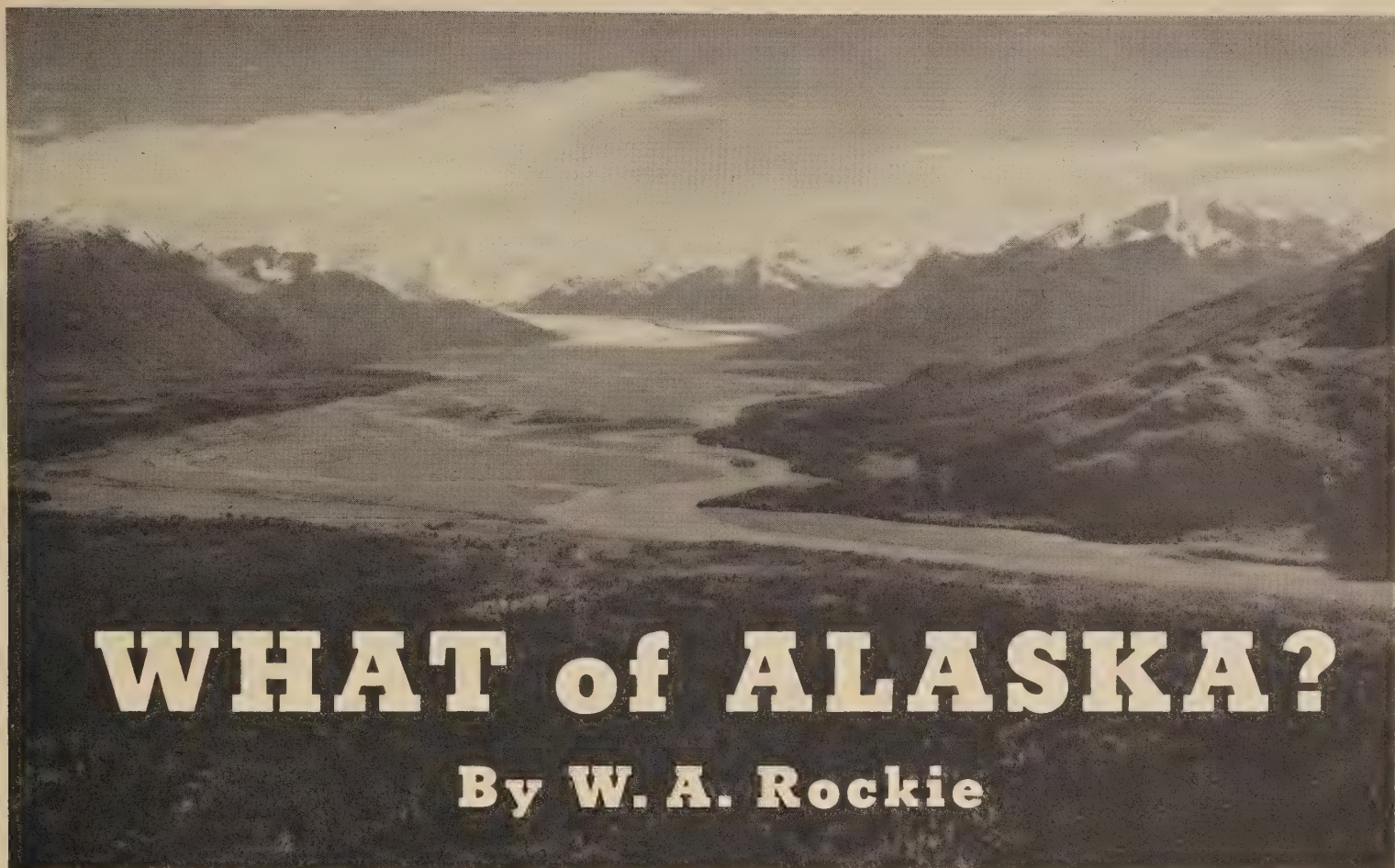
WELLINGTON BRINK, EDITOR

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Front cover: The American elk or wapiti is one of the most popular big-game animals on western mountain-range lands. Properly managed, the elk are an asset; uncontrolled, they often become a liability. Photo by courtesy of Forest Service

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WHAT of ALASKA?

By W. A. Rockie

Looking southeastward from tillable Matanuska Valley lands (area 15) into rugged terrain which typifies the Chucach and other mountain ranges of southern Alaska (area 15) beneath the camera and area 14 in the distance.

FARMING in Alaska involves some specific handicaps. A few of these difficulties are not common in the United States. For instance, the ever-frozen subsoil in most of Alaska has no counterpart in the States. In southern Alaska this feature is generally lacking, but in central Alaska it is everywhere. Winter in Alaska usually begins and ends with a bang not typical in lands farther south.

Wherever green vegetation covers the land it tends to hold back the water and thus make the land wet. The vast extent of such wet land makes mosquitoes and flies a constant torment during the growing season to both man and beast. The short, dark days of winter are intolerable to some people while others value these months as a time for rest and sociability.

A tale of two families who together planned and moved to Alaska shows that one's attitude is the all-important factor in success or failure.

Two skilled tradesmen, co-workers in Seattle, heard, in 1937, that some large jobs in their particular field were contemplated in a certain Alaska

community. Accordingly, they decided to close out their small holdings in Seattle and move to Alaska. They did so, arrived there in February 1938. Each family had more than \$2,000 cash reserve. They had guarded their information concerning work opportunities rather carefully and selfishly and discussed their plans neither with their Seattle friends nor with fellow-travelers en route north.

They experienced a severe and unexpected shock when they found, upon arrival, that they had been misinformed regarding skilled work in their line. There was no such work to be found, either in that community or in any other part of Alaska. These families each consisted of man and wife only. Mr. and Mrs. A were approximately 50 years old, Mr. and Mrs. B were in their thirties.

The shock of disappointment affected the two families differently. Mr. A immediately obtained a job as night watchman, while his wife soon found an unoccupied house in sad disrepair on the edge of town. Together they located and consulted the owner of this property. The owner agreed to furnish all the material for reconditioning the house and in return for their labor, he

NOTE.—The author is regional chief, project plans division, Soil Conservation Service, Portland, Oreg.

agreed to give them 2 years of free rent. The A's moved into the house "as it was." The property included several acres of land, and they planted a large garden.

At the end of a year and a half, this couple's original capital still was intact, and there was half a year's free rent coming. On the pantry shelves were hundreds of quarts of canned vegetables and fruits from the garden and the adjoining woods. Last, but not least, in the 1½ years the A's had saved more than \$800 from wages and sales of vegetables.

Mr. and Mrs. B tried to place the blame for misinformation upon somebody—anybody, and they sat down to wait for work to come. Nat-

urally, no work found them and they just rested in their apartment (and apartments are expensive anywhere in Alaska). At the end of a year and a half they had spent practically all of their reserve, nothing had been coming in. Words cannot adequately express (1) Mr. and Mrs. B's disgust and dissatisfaction with Alaskan conditions, people, and opportunities, or (2) Mr. and Mrs. A's praise of identically the same conditions, people and opportunities.

The A's and B's came to Alaska together and they found themselves in the same predicament. The A's worked and succeeded while the B's shouted calamity and failed. Industry, will to succeed, attitude and ambitions accounted for the success which ensued on the one hand and the failure which resulted on the other.

Hundreds of magazine and newspaper articles and a few Government bulletins on Alaska's agricultural possibilities have been written since 1940. Most of them use the long-standing estimates of more than 60 million acres of potential farmland, but none has shown even vaguely where these farmlands are located.

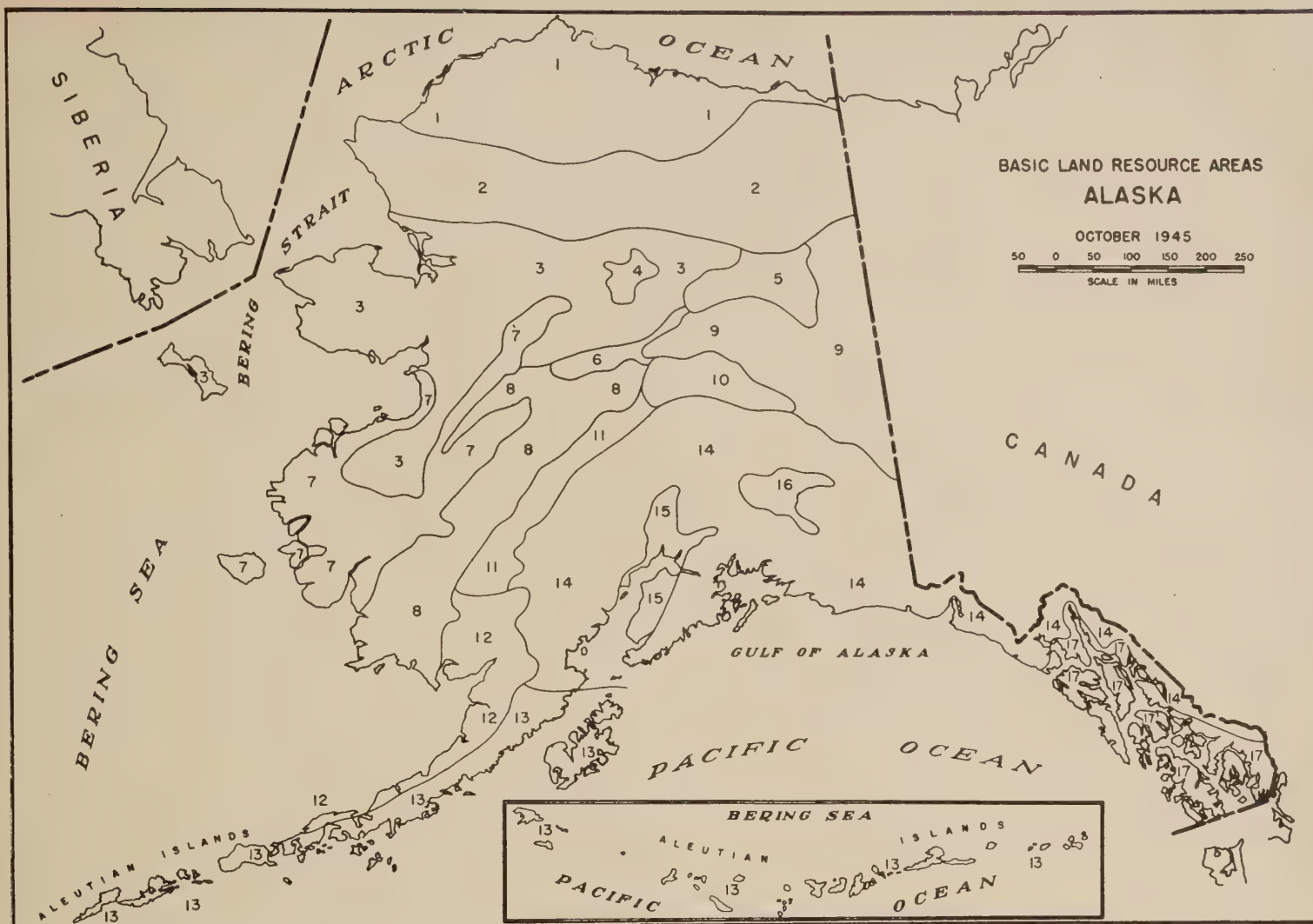
I have tried, on several occasions, to determine where these sixty-odd million acres are located. I have been utterly unable to place them on any map. I do know where a few million acres lie,



The Matanuska Valley includes level tillable lands such as those already developed in this picture.



Matanuska Valley also contains poorly drained land (foreground) and rough, hilly land (center) unsuited to farming. Rough mountains lie to north, east, and south.



and the main purpose of this article is to designate them specifically.

The major part of today's farming in Alaska is in or near the Matanuska Valley in southern Alaska. However, this entire valley contains only a few hundred thousand acres, most of them not tillable.

My own information is based on extensive soils, topographic and climatologic studies in all sections of the Territory. In 5 different years I traveled more than 3,000 miles on foot, 15,000 miles by auto over all Alaska's prewar roads. I covered 8,000 miles by boat on its waterways, and 12,000 miles by airplane.

Don L. Irwin, for 12 years superintendent of the Matanuska Agricultural Experiment Station, and W. T. White, who had charge of agricultural experiments at Fairbanks, Matanuska, and Kodiak for nearly 15 years, assisted me in preparing the estimates.

In this brief article I shall undertake to:

(1) Compare the size of Alaska with lands we know better.

(2) Divide its area into parts which I have designated as basic land resource areas.

(3) Describe very briefly each of these 17 basic land resource areas.

(4) Indicate in which of these areas the potential farmlands are located.

The Territory of Alaska is about one-fifth the area of the United States, but its islands and mainland are so scattered and shoestrunged that its overall length and breadth are almost as large as the length and breadth of the entire United States.

However, if Alaska's tails were blocked in solid, its area would be equal to that of Washington, Oregon, California, Idaho, Nevada, and about two-thirds of Utah.

For purposes of examination, I have carefully subdivided Alaska into 17 different parts which are designated here as basic land resource areas. A brief description of each area follows:

1. ARCTIC LOWLANDS

(53,800 square miles—roughly the size of Iowa)

This area has such severe climatic conditions that its entire acreage is classed as nonagricultural. The handi-

caps of agriculture are so great here that even gardens are not considered feasible.

2. BROOKS RANGE

(79,000 square miles—roughly the size of Idaho)

This area also has sufficiently severe climatic conditions that its entire acreage is classed as nonagricultural. It contains more locations of producing gardens than do the Arctic Lowlands. It is classed as entirely nonagricultural first because of the unfavorable climate and second because most of the area has mountainous topography.

Individual small home gardens exist at some locations within the area, but their total acreage, either now or in the future, appears destined to remain negligible.

3. ARCTIC CIRCLE UPLANDS

(70,500 square miles—roughly the size of Oklahoma)

Although the climatic conditions are not quite so severe in this area as in Nos. 1 and 2, they, combined with rough topography, preclude the likelihood of any great agricultural development. Some gardens of hardy vegetables are currently grown in this area, but the total acreage of land so used is quite negligible. It is estimated that not more than 5,000 acres would lend itself to agriculture.

4. ALLAKAKET LOWLANDS

(3,100 square miles—roughly 1½ times the size of Delaware)

Some of the valley lowlands in this area are sufficiently warmed in the summer for a considerable variety of hardy garden vegetables to be successfully grown in most years.

However, since most of the acreage is mountainous or rough hilly land, relatively little total acreage will be cultivated. A larger acreage might prove to be successful grazing land. It is estimated that not more than 10,000 acres can be used for agriculture.

5. UPPER YUKON BASIN

(11,200 square miles—roughly the size of Maryland)

Climatically this area is not materially different from the preceding area, but since most of it consists of alluvial land or extensive rolling hills, under heavy population pressure it could possibly undergo major agricultural development. However, an extremely limited development appears more probable even under such conditions. It is estimated that not more than 215,000 acres would be agriculturally used.

6. MIDDLE YUKON BASIN

(4,700 square miles—roughly the size of Connecticut)

The potential tillable lands in this area are benches along the Yukon River, which while having a winter climate practically as severe as in the preceding areas, has more summer warmth than nearer the coast. Very little of these benchlands are suited to tillage without intensive land preparation, particularly drainage. It is estimated that not more than 6,000 acres would become agricultural.

7. LOWER YUKON BASIN

(47,500 square miles—roughly the size of Mississippi)

Most of these lands are low-lying tundra areas, development of which may be possible, but is believed to be most

improbable. There is a scattering of lands having agricultural possibilities, but my estimate puts them at not more than 300,000 acres.

8. OPHIR-IDITAROD UPLANDS

(44,200 square miles—roughly the size of Pennsylvania)

This area includes rolling hills and mountains as well as extensive level plains. However, because of highly unfavorable climatic conditions, generally rough topography, and the well-nigh universal tundra of the arctic, very little agricultural development within this area seems probable. It is estimated that such land use would not exceed 27,000 acres.

9. YUKON-TANANA UPLANDS

(41,600 square miles—roughly the size of Ohio)

Most of this area consists of rolling to hilly uplands, some of which may become grazing lands for domestic livestock. Some of the more level and gently sloping portions might be farmed. It is estimated that not more than 2,660,000 acres would be agriculturally used.

Both farming of cultivated lands and range production of livestock appear to be definite possibilities in this area.

10. TANANA VALLEY

(9,300 square miles—roughly the size of Vermont)

This area consists mainly of the glacial outwash deposits which typify the Tanana Valley. The climate is severe in winter, but the chief handicaps to agricultural development appear to be gravelly land and inadequate drainage. Nearly all of the lands are swampy and my estimate is that not more than 300,000 acres will be used for any phase of farming.

11. KUSKOKWIM VALLEY

(13,900 square miles—roughly half the size of Maine)

This is a lowland paralleling the northwesterly edge of the Alaska Range. It is traversed for half its length by the Kuskokwim River. Inadequate drainage is the chief obstacle. In addition, the winters are truly severe. It is estimated that not more than 450,000 acres will be agriculturally used.

12. BRISTOL BAY LOWLANDS

(19,300 square miles—roughly two times the size of New Hampshire)

This extensive area, chiefly lowlands, is very poorly drained and offers little promise of agricultural development. My estimate is that not more than 125,000 acres will be used for farming.

13. ALEUTIAN RANGE

(27,600 square miles—roughly the size of South Carolina)

The chief handicap to major agricultural development in this area is the mountainous topography. It is generally so rough that any sustained use of the land, even grazing, is out of the question. The temperature is sufficiently equitable, however, that livestock growing might



View southward across the Matanuska Valley toward Pioneer Peak from Palmer (foreground). Photo by courtesy of Pacific Aerial Surveys.

eventually occupy a minor acreage of this island chain. It is estimated that not more than 875,000 acres will be so used.

14. ALASKA ICE CAP

(124,000 square miles—roughly the size of New Mexico)

This area, which includes nearly one-fourth of all Alaska's acreage, consists chiefly of the roughest mountainous expanse on the North American continent. Since, however, its fringes are broken by innumerable shoestring valleys in which the climate is relatively mild and its mass of high altitude mountains encloses occasional basins having some agricultural potentialities, it is estimated that as much as 800,000 acres might eventually be so used.

15. COOK INLET LOWLANDS

(7,900 square miles—roughly the size of Massachusetts)

This area, of which the Matanuska Valley is a part, holds the greatest promise for agriculture in the entire Territory. It is estimated that as many as 1,000,000 acres may be developed for farming purposes.

16. COPPER RIVER BASIN

(53,300 square miles—roughly the size of Connecticut)

This area looks better to the eye than studies to date indicate it actually is. Frostiness is the chief handicap

but this may not be prohibitive. It is estimated that as much as 175,000 acres might be used for farming and livestock production.

17. SOUTHEAST ALASKA FIORDS

(23,400 square miles—roughly the size of West Virginia)

Except for an occasional narrow alluvial valley this area is as rough and precipitous as any on the continent. Generally mild and equable climatic conditions favor the use for agriculture of all areas in which topography and soil are suitable. These are limited to the floors of the narrow dissecting valleys. It is estimated that as much as 150,000 acres may be expected to become agricultural.

All that these estimates are meant to portray is whether the development is of major or minor character. This study establishes definitely that major farming developments will center primarily in area 15. A second major farming and livestock producing center probably will develop in the vicinity of Fairbanks (areas 9, 10, and 11). A third, smaller center of dairy, beef cattle, and sheep production may develop at Kodiak (area 13). It is possible that a livestock center might

possibly spring up in the Copper River Basin (area 16). Major developments in the other 11 areas are out of the question for one reason or another. Shoestring and checkerboard farms do occur in most of these other areas, but the

development of extensive agricultural land-use is impossible.

The seven million odd acres of land which apparently are suited to agriculture classify as to capabilities approximately as follows:

ESTIMATED ACREAGE OF AREA IN EACH LAND CAPABILITY CLASS

When land can be used by simply clearing and/or cultivating

(000 omitted)

	I	II	III	IV	VI	VII	VIII	Total
1. Arctic Lowlands	0	0	0	0	0	0	34,432	34,432
2. Brooks Range	0	0	0	0	0	0	50,560	50,560
3. Arctic Circle Uplands			1	1	2	1	45,115	45,120
4. Allakaket Lowlands		2	2	2	2	2	1,974	1,984
5. Upper Yukon Basin		40	35	35	70	35	6,953	7,168
6. Middle Yukon Basin		1	1	1	1	2	3,002	3,008
7. Lower Yukon Basin		30	30	30	120	90	30,100	30,400
8. Ophir-Iditarod Uplands		3	3	3	10	8	28,261	28,288
9. Yukon-Tanana Uplands		0	265	0	1,065	1,330	23,964	26,624
10. Tanana Valley		60	60	60	60	60	5,652	5,952
11. Kuskokwim Valley		90	90	90	90	90	8,446	8,896
12. Bristol Bay Lowlands		25	25	25	25	25	12,227	12,352
13. Aleutian Range		175	175	175	175	175	16,789	17,664
14. Alaska Ice Cap	0	160	160	320	160	0	78,624	79,424
15. Cook Inlet Lowlands	50	100	150	200	400	100	4,056	5,056
16. Copper River Basin		35	35	35	35	35	3,217	3,392
17. Southeast Alaska Fiords		30	30	30	30	30	14,826	14,976
Total for Alaska	50	751	1,062	1,007	2,245	1,983	368,198	375,296

(Classes I to IV are four qualities of tillable land. Classes VI and VII are two qualities of grazing land. Class VIII is considered unsuited to any agricultural use. Class V is established in theory; in this study it was not used.) From these estimates, the tillable area totals 2,870,000 acres, and the rangeland area totals 4,228,000 acres. Complex problems of land use are certain to arise on all of these lands, and some of them may be peculiar only to Alaska.

After cutting the Territory into 17 pieces, studying the potentialities and capabilities of each segment and then adding up the results, I am forced to conclude that the area of land really suited to agriculture in Alaska is much less than the long-standing estimates have indicated.

I could conscientiously make larger estimates by giving my wildest imagination full rein and making myself believe that all drainage problems on Alaska's lands can be easily overcome. On that imaginary basis, I prepared an alternative set of estimates. In those portions of the Territory in which climate and precipitous topography present the chief handicaps, even imagination permits little change in one's conclusions.

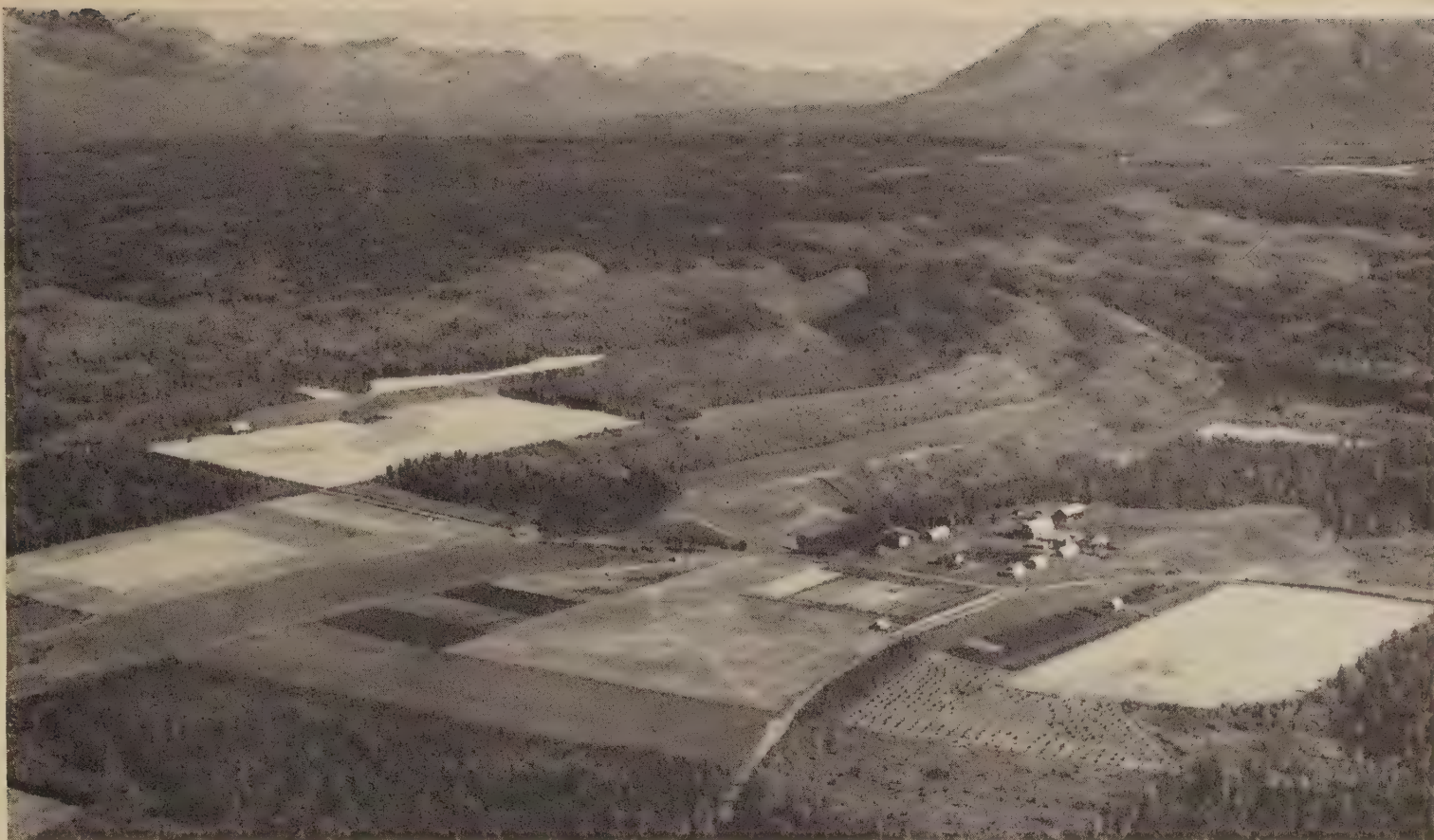
In some of the vast plains and valleys, however, the potentialities would be multiplied many times.

On such a basis, these enlarged estimates—which I consider badly founded—raise the 7,098,000 acres of potential agricultural land to 58,605,000 acres.

Most of the potential farming lands are still inaccessible to any existing transportation, even in areas 15, 9, and 13, where the most immediate probabilities and most inviting lands are situated. Farming development in Alaska will largely follow transportation. It will not often precede transportation as it so often did in the United States, chiefly because of the greater difficulty of building and maintaining roads under the prevailing soil, climatic and drainage conditions. However, if Alaskan settlement is to succeed even in the face of some of the problems of land settlement and development which has handicapped agriculture here in the States, adequate classification of the land and its capabilities should be provided in advance. Naturally, proper land use should follow.

The Federal and Territorial Governments are deeply concerned with the proper settlement and development of these lands. They are the only remaining extensive areas in continental United States where the American pioneer's home-build-

(Continued on page 160)



The Matanuska Agricultural Experiment Station (right center) is assisting farmers to establish permanent, profitable agriculture. Palmer, seen directly beyond the station, is about 6 miles away.



Palmer, in 1940, looking northeast. The privately owned and privately built town occupies the foreground; Government constructed buildings lie on the other side of the track. Additional construction is beginning in 1945.

Planning for Soil Conservation

By HUGH BENNETT, Chief, Soil Conservation Service

IN THE United States we have learned that we must have soil conservation if we are to have continuous, abundant agricultural production. And we have learned, too, that it must be efficient conservation—the kind that will keep our land permanently productive.

In turn, soil conservation requires intelligent use and maintenance of our land resource. This may mean contour cultivation and terracing to hold soil and conserve rainfall. It may mean seeding grass or planting trees to meet the needs of bare, steep slopes or shallow soil. It may mean changing a rotation to increase soil productivity, and so on.

First of all, however, soil conservation requires a plan—a workable, practical layout of the farm, showing what needs to be done and what can be done in every field, pasture, and wood lot of the farm.

Such a plan can be developed best with a map of the farm that shows (1) the location of the various soils, (2) the slope of the land, (3) the degree and extent of erosion, and such features as field and pasture boundaries, areas of grassland and woods, fences, streams, gullies, roads, cattle lanes, and buildings. The complete plan must show which fields require strip cropping or terracing; which lands need to be planted to trees or hay crops and which should be kept in pasture; where dams should be built across gullies; and where waterways must be installed for safe disposal of excess rainfall.

Planning in this way for the development of soil conservation farming is like making a plan to guide the building of a house, or the drawing up of specifications for digging an irrigation ditch or installing a fishpond.

The Way to Land Security.—Through its Nation-wide program of work on the land in cooperation with soil conservation districts, the Soil Conservation Service has led in the development and application of new and improved measures for the control of erosion, conservation of rainfall, and improvement in land use. The Service is helping individual farmers and ranchers, as well as groups of farmers and ranchers, to adopt these practical measures over the widest possible area, and to solve other problems relating to the maintenance of soil productivity.

The Soil Conservation Service is not a lending agency and makes no benefit payments of any kind to farmers. Essentially, it is a corps of trained, experienced specialists in land, plants, animals, and land use, organized to work cooperatively with farmers out on their land, chiefly by supplying technical assistance, all the way from planning the work to helping with its application and maintenance. And, too, the Service carries on, in cooperation with the States throughout the country, a program for the development of new and better methods of conservation and for getting immediate, practical answers to questions that constantly are arising in connection with the operational program.

If there were some standardized, simple remedy for the ills of the land that could be applied indiscriminately, the job of soil conservation would be comparatively easy. But there is about as much variety in soil, in erosion, and in the performance of water and wind and plants, as in the landscape of the country. Control methods that work wonders in gully torn cotton country may do more harm than good on the dusty wheatlands of the Great Plains. And many of those quite practical on the high-yielding corn lands of the Midwest may not be applicable to the dairy and vegetable lands of the Northeast. Even on neighboring farms, and often in the same field, land problems are almost never completely identical. And in those localities where much of the precipitation is in the form of snow, special measures are required to safeguard farm and range land. In short, the soil and water conservation program must be sufficiently flexible to meet all the possible conditions and needs.

The specific land treatments used and recommended by Service technicians may therefore vary from one valley to the next, from farm to farm, and even from field to field. Before any work is done, each farm or ranch is carefully analyzed, both as a piece of land and as a business enterprise.

In making a physical analysis to determine productivity, needs, etc., field men of the Service carefully note, on the ground, the exact lay of the land, the quality of the soil, the degree of erosion damage, and the prevailing erosion hazards on every acre of every field, woodlot, and pasture over the

entire farm. As accurately as possible, these conservation technicians determine which lands can be cultivated under good farm practices without excessive loss of soil and rainfall, and at reasonable cost in labor and material; which lands need the protection afforded by special crop arrangements, special tillage practices, or structural installations; and which ones require a permanent cover of trees, grass, or other protective vegetation. In those localities where irrigation is practiced, specialists are even sent every year into the snow-bearing mountains of the upper watersheds to determine how much water the farmers in the valley below may count on for their seasonal plantings when the deposits of snow melt.

The next step is to work out with the farmer a farm plan for practical operation, based on the ground information acquired and translated into eight simple land-capability classes.¹ This the soil conservation technician does, not indoors around a table, but out in the fields, pastures, woodlots, gullies, and abandoned and idle areas, working along with the farmer himself—with all the pertinent facts immediately at hand for full and understanding consideration.

In some cases, the new arrangement, based on the physical aspect and needs of the land, may not entirely fit the farmer's pocketbook. It may call for more hay crops than he actually needs or can sell and not enough potatoes or corn or wheat; it may propose other changes the farmer cannot afford to make. If so, it is not a good arrangement in a practical sense, and it must be adjusted, if possible, to meet family needs and market opportunities—and the farmer's personal preferences. Purely from the conservation standpoint, however, the farm arrangement based on physical land analysis is ideal. The closer the farmer can approach it and still make a good living, the more stable and productive his land will be, and the surer his income, over the long run.

Drawing up a satisfactory land-use and land-protection plan for a farm is only half the job—or less. The other half involves the actual application of the plan to the land.

Each parcel of land generally needs some special practice or treatment for adequate protection and maximum production. But so far as can be done safely the farm plan is made flexible to allow some choice of crops to be grown or methods to be used.

Steep or unproductive croplands, for example, may be earmarked for a permanent cover of grass or legumes, or trees; farm woods may be planned where grass is not paying out or is failing to hold the soil, and vice versa; gullied areas may be turned into grass-covered waterways, or farm sanctuaries for animals and birds, or valuable pastures of kudzu.

Croplands generally should be farmed in rotation, as nearly on the level as may be practicable, and sometimes in strips. On the more erodible slopes, terraces or diversion ditches are frequently needed for added protection. Pastures often need to be contour-furrowed, limed, fertilized, cleared of weeds before the seed mature, and grazed with caution to improve the growth of grass. Woodlands need to be fenced to keep out livestock, and they need to be protected from fire and managed according to scientific principles of forestry. These are only a few of the dozens of erosion-control practices that may be called into use to fit particular situations.

Advent of the Soil-Conservation Survey.—A short time before the establishment of the Soil Erosion Service (September 19, 1933) Glenn Fuller of the Georgia Agricultural College and the author worked out a tentative method for mapping the effects of soil erosion. Primarily, the method was based on a classification of land types—not soil types. These classes were determined by soil, slope, and degree and kind of erosion. The surveys made at the time showed not only these physical factors but also the broader types of land use. The first work was done in the old plantation belt of the Piedmont section of Georgia, starting on February 9, 1933.²

Here was the first attempt on an extensive scale to classify and map erosion conditions in their relation to other physical characteristics of the land, its agricultural capacity and its conservation needs. It was also the first time erosion had been mapped under a system which classified both erosion and slopes by types. This information, which should have been available long before, immediately provided the basis for a much better understanding of soil erosion, and the land itself.

The most important result, however, was that this new kind of survey proved extremely useful in planning for the application of complete soil conservation operations, both for erosion control

² Georgia Land Use Problems. Georgia Experiment Station, Bulletin 191, May 1935.

¹ See Soil Conservation, December, 1945.

and for bringing about needed, scientifically balanced land-use adjustments, on entire farms. The Soil Conservation Service subsequently adopted this system of survey as a basic tool of its integrated action program on the land, and has continued to use it—with occasional refinements.

So it was that in 1939, for the first time in the history of our country, we began producing simple maps—generally showing no more than eight land classes, or land-use capability classes—as a basis for planning soil and water conservation. The classes range from land of such favorable quality and condition as to require no special treatment for sustained use and for adequate protection against erosion, through land that requires a variety of treatments for efficient and safe cultivation, to land that should never be cultivated under any circumstances.

The foregoing is no more than the barest outline of this new and comprehensive type of survey—the *land-capability survey*—which is receiving the widespread approval of farmers and soil and water conservationists throughout the country.³ It is just the kind of survey we need in soil conservation operations and land repair work.

Mention should also be made here of the Nationwide reconnaissance of erosion carried out by the Service in 1934 and 1935. Previously a partial and very general survey of erosion conditions over a large part of the country was made by the author,⁴ but it lacked detail, both with respect to classification and distribution of erosion. Until the 1934-35 reconnaissance erosion survey was made (published by the Soil Conservation Service, 1935) there was no source of information in existence that showed in any adequate way the general extent and distribution of erosion throughout the United States.

Special Planning Conditions.—Regional variations in land conditions, climate, and type of farming quite naturally have an influence on conservation planning. In the great livestock range areas, for example, soil conservation takes a somewhat different form than in the farming regions. In range areas, less emphasis is normally placed on basic shifts in land use; and stress is more along the line of protection and improvement of

grass through careful management of livestock. Fundamentally, however, the conservation plan on a western ranch is like that on an eastern farm. It is a combination of good land use, appropriate management of land and grass, careful conservation of rainfall, and adequate soil defense, based on the inherent needs and adaptabilities—as well as the man-induced conditions—of every single acre.

Planning for conservation on farms where drainage is an important requirement calls for careful consideration of upstream conditions. For example, where open ditches are the best means for draining wet lands, every effort should be made to control erosion on the entire watershed contributing run-off to the drainage canals and ditches, so as to reduce silting to a minimum. This can be done much easier where the watershed lies within the boundaries of a single farm than where it reaches into several farms. Situations of this latter kind necessitate group planning, if a good job is to be done.

In areas of irrigation farming, provision must be made for the safest and most effective application of water, in order to control erosion and avoid water-logging, “scalding,” and waste of water. Also, waste water must be carefully handled to prevent damage to lower-lying lands. Often this can be done advantageously by spreading such run-off over pasture lands or meadows. A good drainage system, installed before irrigation begins, should be a part of all irrigation projects whether a single farm is involved or many farms.

In some localities the soil is so shallow over bedrock that unusual measures are necessary. Sometimes rock lies so near the surface of eroding fields, where it may not be feasible to turn the land over to grass or trees, that blasting is required to provide adequate terrace-channel depth. Exceedingly accurate engineering specifications are called for under such conditions.

Planning for stock-water ponds calls for careful consideration of hydraulic data in order to assure the inclusion of a watershed large enough to provide adequate run-off to keep the reservoir supplied with water. Water-spreading operations, diversion dams, and irrigation of rice fields also require the most accurate information obtainable in order to avoid costly or inefficient installations.

In regions where wind erosion is prevalent, it is important to study the possibility of using windbreaks or grass on critical areas. Consideration

³ Classifying Land for Conservation Farming. Farmers' Bulletin 1853, U. S. Department of Agriculture, 1943.

⁴ The National Program of Soil and Water Conservation. Jour. Am. Soc. of Agronomy, vol. 23. May 1931.

must also be given to the utilization of crop residues, flexible cropping systems, and so on.

In certain glaciated regions, hummocky or hilly topography sometimes prevents satisfactory use of such measures as terracing, strip cropping, and contouring. Under such conditions, it may be necessary to provide as much grass agriculture as possible, together with stubble mulching and the growing of small fruits.

Peat lands and peaty-muck lands are so susceptible to burning in dry seasons that every consideration must be given to maintenance of the water level, by pumping and other means of lowering and raising the ground-water level, in order to control fire. The growing of shallow-rooted crops is frequently called for on such lands.

Whatever the condition or the region, the end product of soil and water conservation planning is an arrangement of fields, pastures, meadows, and woods that safeguards the soil and fits the land according to the requirements of Nature. It constitutes an adjustment in land use most nearly meeting the requirements of the physical environment. Together with the adapted conservation practices, it makes up the complete farm plan for soil and water conservation. Under such a plan, soil conservation is not just an incidental bit of the mechanics of farming; it becomes part and parcel of the whole business of making a living from the land.

Only with such a plan can we get real soil conservation on the land. And only with real soil conservation can we have permanently productive land for a permanent agriculture capable of supporting a permanent nation. *There are no shortcuts, no panaceas, no alternatives to soil conservation; it must be done as I have pointed out here, or it fails. This is not a matter of opinion, but one of physical facts imposed upon the land by Nature.*

Conservation Group.—One of the most promising aspects of the productive capacity of soil conservation districts for getting permanent soil conservation applied on the land is the peculiar adaptability of the districts for utilizing the advantages of group action. This enormous potentiality for getting effective work done, not only in planning but in applying conservation plans to farms, and maintaining the work, is being taken advantage of more and more. The excellent results we have had through this medium speaks strongly for its further use on a rapidly increasing scale.

One of the early widespread uses made of the

conservation-group system was that employed with a very high degree of success in getting more farmers started on soil conservation work through our program of "widespread practice" at the beginning of the war. Some 10,000 group schools were held during winter and at other opportune times of the year, under this plan. Meetings were held in schoolhouses, churches, farm homes, even in barns and out-of-doors, attended usually by from 6 to 12 or more farmers or ranchers of compact localities, communities, neighborhoods, drainage basins, forks-of-the-creek, school districts, townships, and other localities. Technicians of the Soil Conservation Service met with these conservation groups and explained the simpler kinds of work that farmers without much experience in soil conservation operations could take hold of and go ahead with during the period of war-imposed scarcity of manpower, gasoline, tires, and trucks, while waiting for further essential guidance by the technicians.

This intensive effort during the course of a single year, resulted in getting one or more soil conservation practices in operation on more than 400,000 farms throughout the United States—and, incidentally, contributed much, in conjunction with the other regular soil conservation work, to the splendid achievement of the farmers of the country in supplying the Nation and its armed forces with the increased amounts of food called for by the war. This local type of farmer cooperation has been extensively used in the districts' work for pushing ahead with the regular cooperative program of the Service in planning, putting plants into operation, and maintenance.

In conservation-group planning work, technicians explain the land capability classes to farmers and ranchmen, showing how they help work out the necessary blueprinting of farms and ranches for soil and water conservation operations. Supplied with land-capability maps of their farms, made by the conservation-surveyors, many operators are going ahead with some of the preliminary work in planning their lands for operations. Soil conservation technicians, visiting the farms after such preliminary work by the farmer, are thus aided in speeding up both planning and operational activities. The farmer thus comes to understand better what complete and permanent soil conservation is and how it applies to his own farm or ranch. And often his enthusiasm for getting along with the work is increased—and this helps, too.

[illegible]

LEGEND

- Terraces with contouring between
- Small Stream
- New Fence
- Field numbers in ○

PLANNED LAND USE

FORMER LAND USE

LAND CAPABILITY CLASSES

Corporal Eugene Atkins, war hero, is now prepared for a winning battle on the land. First step is this scientific planning of his farm along soil conservation lines.

He works with his neighbors. Grassed waterways and ditches are serving two or more farms, terraces cross farm boundaries, farmers are putting grass and clovers on land where they are suited and leasing grazing they do not need to their neighbors, and neighbors are swapping work to get conservation farming under way. And the tax base is being preserved.

It is impracticable to give here anything like a detailed account of how group planning, group discussion, group enthusiasm, and group relationships are developed, enlarged, and spread about through these neighborhood activities. I just recently (November 1945) talked briefly with a farmer—Mr. Charles Swofford of Gaffney, S. C.—in the Midway community of the Broad River Soil Conservation District, who had been selected by the forty-odd farmers of the neighborhood as group leader. He told me that the farmers of his community were meeting rather frequently at convenient places for discussions on soil and water conservation matters, “* * * and sometimes we get people to come in to talk to us, show us moving pictures, and so on.”

“Something over 26 farmers now have soil conservation work pretty well established on their farms, and some work has been done on nearly 40 farms of the neighborhood. Some absentee land ownership and shortages of labor and machinery have held work back somewhat.

“This community work has helped the district get applications from farmers to do soil conservation work on their farms—and I mean good, live applications, from farmers who mean business.

“At our community meetings farmers are told just what a farm plan is, so they will understand that it is a practical guide for using land according to its proper use, or ability to produce, and for treating the land according to its needs, within the farmer’s economic ability.

“This kind of working together is making us talk more with one another about our farming matters than we used to in the neighborhood. Now any farmer in the Midway section will advise any other farmer about this or that, where formerly we just didn’t work together that closely. It’s doing a lot for us; we are getting the work done and we like it. Our crops are better and the soil is staying in the fields, getting better in many of them.”

Regretfully I had to leave Mr. Swofford at this point; for we were rapidly getting down to brass tacks. However, on leaving I drove through

Midway and saw what was going on. It was an amazing sight. Good soil conservation spread out before us across the landscape: Terracing, strip cropping, contouring, crop rotations, waterways safeguarded with sericea lespedeza—and a bale and a half of cotton per acre!

That’s what comes from soil conservation work in soil conservation districts, with conservation-group planning and everybody working together. That little visit out into the Midway community, and previous visits to other communities in many other parts of the country, convinces me that the forks-of-the-creek neighborhoods and other compact groups of farmers are the backbone of America, the solidest thing we have.

Let’s everybody push these neighborhood or group efforts all over the country, and get behind their leaders—assist soil conservation district supervisors they call them in many localities.

The accompanying charts of a 62-acre farm, in the hill country near Spartanburg, S. C., show (1) the former land use on the farm, (2) the land capability classes, and (3) the farm plan for permanent conservation of the soil and for saving rainfall.

I had the opportunity to go over this farm when, on November 14, 1945, it was presented by his appreciative neighbors to Corporal Eugene Atkins, recipient of the Congressional Medal of Honor for heroic deeds in the Battle of Luzon.

This farm plan illustrates what we mean by “farm planning.” Those who went over the farm that November day had no difficulty seeing and understanding what this modern on-the-ground blueprinting for conservation and prudent land use really means—how the use of the land and provisions for its protection against impoverishing erosion are made to fit the kind of land that nature has developed here. The scientific fitting of farming methods to the land was especially easy to see and understand in this case. This was because the technicians of the Soil Conservation Service, cooperating with the Broad River Soil Conservation District, hadn’t been satisfied with turning over to Corporal Atkins just a planned farm. They had gone ahead and carried out every detail of work provided for in the plan that the season permitted. The terraces were all built, the strip-cropping system was laid out and seeded or prepared for seeding, stabilized waterways were provided for, steep slopes planted to trees, a fish-pond was installed, and so on.



Atkins listens while District Conservationist Talbert explains that steep land like this should be in perennials, not cotton. This area is planned for lespedeza sericea, a deep-rooted hay or grazing crop—a heavy-duty plant excellent for erosion control.

Previously, Jackson Bennett had made a land-capability survey of the farm, and then, with this map (map No. 2) in their hands, Corporal Atkins and District Conservationist J.H. Talbert had gone over every part of the tract, working out cooperatively just what should, and could, and would be done to keep the many different kinds of land permanently safe and permanently productive.

Going over a farm thus treated for permanency and continuing productivity, whether that farm is in the red hills of Georgia or the brown hills in the Palouse wheatlands of Washington State, is the best possible way to see readily just what modern soil conservation is—how it works out in a practical farm way and how *nature made it so that there can not possibly be any other way to put permanent conservation on the land*. And it should be added that *not only is this the one way the job can be done, but it is the cheapest way it can be done, and the most rewarding*.

We can say these things now, since thousands of farms embracing some 30 million acres of land already have been completely treated by the Service cooperating with soil conservation districts throughout the country—and at a Service cost of much less than \$2 an acre for everything—overhead, travel, salaries of technicians, supporting nursery and experimental work, and everything else the Service has put into the job.

Today as we begin another year's work on the

land we are all proud of these almost unbelievable accomplishments in soil conservation. We are also proud that America has taken leadership of the world in soil conservation work. Upon this work the whole welfare of man here on earth depends. Upon it hangs the fate of hungry people in countries where the productivity of the land—the source of life—has been needlessly permitted to wane to the level of malnutrition and recurring famines.

“WHAT OF ALASKA?”

(Continued from page 152)

ing spirit can be given full play. New land is important to land-hungry people during the shift from war to peace. Seven million acres of agricultural land for returning veterans and other peoples displaced by war is an extremely important national backlog. It can be the basis for, and a means of, a new and better life for thousands of American families. It becomes even more important when we view these agricultural developments as being but one segment of Alaska's vast potentiality in industry and business. Future farms in Alaska will range from small subsistence units on which many will choose to live to the larger livestock ranches which will unquestionably come where range land and other resources permit. But whether they are 300 or 3,000 acres, those farms tomorrow can be satisfactory homes for Americans if carefully chosen and wisely used.

A Problem of "Antler Room"

By Paul M. Scheffer and
Richard M. Bond



FENCE lines down, hay stacks overturned and destroyed, thousands of acres of range land trampled and scarred, silt-laden water rushing from eroding hillsides toward irrigation reservoirs! This is the picture confronting Wenas Valley ranchers in central Washington each spring as they watch a herd of elk trailing over the ridges rimming the valley.

It all started back in 1913. To provide better hunting, a group of sportsmen introduced 57 elk—7 bulls and 50 cows—in an area several ridges away from what is now the Wenas Valley Soil Conservation District. These elk apparently found environmental conditions in their new Cascade Mountains refuge about the same as their former habitat in Yellowstone Park. Within a few years, an increase in the numbers of elk was noticed, and there followed a steadily accelerated increase in population until the original herd had been doubled and redoubled many times. In 1921,

8 years after the original planting, the herd was estimated to have reached a size of about 450 animals. By 1931, this number had increased to 3,100. A 1945 pre-hunting season census has not been made. It is not unreasonable to believe, however, that the elk—called the Yakima elk herd—now number around 6,000 individuals, despite the fact that an equal number have been removed from the herd by legal hunting in the past 18 years. Population number is a point that can be argued, but as will be shown later, it is of little consequence, in that there are too many elk in the herd regardless of its present exact size.

As the population of the Yakima elk herd increased, more "antler room" was needed. The original range of a relatively few acres was extended to include an area of approximately 1 million acres of range lands on the eastern slopes of the Cascade Mountains. About two-thirds of this land is summer range for both domestic livestock and big game.

It was in the winter of 1922 that the elk first found their way into the Wenas Valley—15 or 20 miles from their refuge boundary. They plodded

NOTE.—This article is based on factual information obtained from a technical survey report prepared in 1944 by the Soil Conservation Service at the request of the Wenas Valley Soil Conservation Board of Supervisors. The authors are, respectively, assistant chief, biology division, Washington, D. C., and chief regional biology division, Portland, Oreg.



In an effort to prevent starvation, the limited natural winter food supply of the Yakima elk herd is supplemented by the undesirable practice of feeding cured alfalfa hay



The Wenas Valley is not unlike many other valleys in the mountainous northwest where farmers and ranchers have organized for a common cause—the protection of fertile bottom lands, irrigation storage reservoirs, and mountainous livestock ranges from the ravages of soil erosion.

down through unusually heavy snows to the bottom lands. And they were hungry.

There passed several mild winters, when only

an occasional elk or small band was observed feeding around the stacked hay or on the exposed range areas of the lower mountain slopes. The ranchers

and their families were fascinated by the sight of wild game animals weighing up to 600 or 700 pounds trailing through their farmsteads. They gave little thought to the fact that the mature cow elk would return the following year with calves and that these calves would be back within 4 years with their progeny. A few of the ranchers saw the handwriting on the wall as early as the winter of 1925, when minor losses from elk depredations were noted.

The Yakima elk herd had never held such a convention as it did in the Wenas Valley in the severe winter of 1938. Most of the caucuses took place around numerous haystacks scattered along a 10-mile stretch of the narrow valley. One "committee meeting" was held in Otis Rosenbush's barn, and 30 tons of cured alfalfa hay was consumed before the meeting was concluded. Fences were hastily thrown up to protect haystacks, only to be torn down by hungry elk the next night. Dogs were chained near the stacks, but the elks' pangs of hunger were stronger than the fear of the guard's bark. Many ranchers resorted to spending uncomfortably cold nights in tents pitched on the lee side of their haystacks. Here, they catnapped with a Winchester within easy reach; the more hay they saved, the less they would have to buy and haul in for their stock.

This same story was repeated on a greatly increased scale in January and February of 1943, when about 1,000 elk wintered in Wenas Valley. Although a definite indication that the elk lacked sufficient natural winter range was shown by their concentrations around haystacks, this fact was further evidenced by the weakened condition of the animals. Sunday afternoon rodeos were held, and small boys rode a few starved critters while their older brothers roped and branded some of the less weakened individuals.

From technical studies made of forage conditions on the summer range lands of the Yakima elk herd, it is questionable whether the elk are able to put themselves in condition during the summer months to be able to withstand the privations encountered during the severe winter in the Wenas Valley. It is certain that the elk on some of the summer range areas do not find enough feed to be able to spend much time chewing their cud. This accounts for a considerable proportion of elk coming to their winter concentration areas in a not-too-good condition—a condition that should alarm the sportsmen for what it forecasts. Let's

follow the spring migration of elk out of the Wenas Valley back to the summer ranges and see what is happening on those areas.

As the winter snows begin to melt from the Wenas Valley slopes, the elk begin their return migration to the summer ranges. They follow the gradually receding snow line, and feed on plants exposed only a few days previously by action of the mild spring weather. This period is an extremely critical one for plant growth. The grass and other plants on the lower ranges do not mature until about June 1, but the elk generally are grazing these areas in February or March. In the higher elevations, the forage matures and is eaten by the elk at correspondingly later dates. During the early stages of growth, the plants cannot be grazed unrestrictedly without serious injury. Such injury often results in near denudation of the grazed area and, in a few years, the complete extermination of the desirable forage species. Because of the heavy concentrations of foraging elk that habitually range just below the receding snowline, damage of this type is widespread in the Wenas Valley.

In addition to the injury to forage plants during the spring and early summer, the heavy-bodied elk plow up the wet, soft soil as they trail and trample about in search of feed. As Don Warnick, one of the Wenas Valley ranchers, put it "What grass the elk don't eat they push a foot or two into the mud with their hoofs. This may be somewhat of an exaggeration but the fact remains that of the 127,000 acres of range lands in the Wenas Valley, approximately one-half, or 60,000 acres, are grazed by the elk." Observations of range examiners show that the elk consume or destroy about one-third of the annual production of perennial forage on this area. This is one of the problems that Roy Longmire, the Coffin Brothers and other soil conservation minded Wenas Valley ranchers must contend with in the protection of their lands. There are other problems.

We have now followed the elk up to an elevation of four or five thousand feet and have another two or three thousand feet more to go before reaching the upper limits of the summer range. This range is outside of the Wenas Valley, but it is grazed by livestock from this and other areas. We are right behind the elk, but we are still two or three months ahead of the cattle and sheep that will follow—grazing the same areas and looking for the same



When the protective covering is stripped away by sharp hoofs and grinding jaws, soil erosion takes its toll. Soil from areas such as this is reducing the water-storage capacity of the Wenas Valley irrigation reservoir.

feed, but at a time when use of the range is proper. We cross Rocky Prairie and go over Bald Mountain and follow the slopes and ridge high above the Naches River to the summit of the Cascade Range. Then we go under the eastern crest of the Cascades through alpine parks and cirques, criss-crossing mountain meadows and open slopes and finally descending the pine-shadowed trails leading down the Tieton River. This trip has taken us through 700,000 acres of domestic livestock and big game summer range with evidence of range abuse and deterioration almost at every turn in our trail.

We have seen that the condition of the summer ranges varies from good in a few local areas, such as Conrad Meadows, to complete destruction in a few other places like Bethel Ridge and the Wildcat Creek area. The condition of the summer range as a whole is from fair to poor and is getting worse. The range areas in poorest condition are producing one-tenth or less of the forage they formerly did and generally coincide with the areas of greatest elk summer concentration. Occasionally we passed small plots set up by the Forest Service to study the utilization of summer range by elk. The evidence that drastic action needs to be taken to relieve this overuse was damningly clear at these points.

We did not overlook the toll that soil erosion is taking on lands that are being stripped of their protective covering by sharp hoofs and grinding jaws. Soil erosion in various stages of severity is occurring in all of the over-grazed areas of the Yakima elk herd range. The critical areas coincide with areas where the vegetation has been most depleted. Here, 75 to 100 percent of the topsoil and 25 percent of the subsoil has been lost—much of it down streams and rivers to settle

into the Wenas Valley reservoir and other important irrigation water storage areas.

Before we get out of the mountains, let's stop and get some first-hand information from Arnold Arneson and Horace Cooper, United States Forest Service District Rangers. They are very much concerned about the problem, inasmuch as they represent the Government agency responsible for the protection of the resources on the area where the Yakima elk herd ranges. These men paint



Bethel Ridge was originally overgrazed by domestic stock but has been badly abused by elk of the Yakima herd since 1920. Sage brush and weeds have replaced valuable forage plants. Note the high-skirted aspen trees.



Conrad Meadows is only slightly used by elk of the Yakima herd. Thus, proper range management practices can be effected. Note abundant palatable grass remaining after domestic livestock use.

a rather disturbing picture by showing us the records of domestic livestock use of range lands in their districts. These records illustrate the deterioration of the summer range areas of the Yakima elk herd.

"In 1927, for example," Cooper tells us, "there were 3,120 cattle and 25,110 sheep grazing on the summer ranges now used by the elk. Because of the accelerating decrease in carrying capacity, it was found necessary to make a reduction in the numbers of livestock permitted on the range. In 1942, the cattle had been cut to 1,228 head and the sheep to 8,492 animals—a reduction of 74 percent

in 15 years. The Federal Land bank says that it will be economically impossible for the owners of this livestock to operate if further reductions are made.

"In 1937, we made a detailed survey of the range lands used by domestic stock," Cooper continues, "to determine their livestock carrying capacity. The capacity or safe use of the range was found to be about 18,300 animal unit months (1 cow or 5 sheep or 4/5 elk grazing for a period of 1 month equal 1 animal unit month). Range utilization by domestic livestock at that time was 13,000 animal months, or 29 percent below carrying capacity. Elk use of the domestic stock range has been so heavy that since that time it has been necessary for the Forest Service to reduce the permitted livestock by 3,250 sheep. This lighter use of the range is still above the carrying capacity due to the dual use by both wildlife and domestic stock. Unless there is a reduction in the elk numbers it will be necessary to further reduce the domestic stock."

"We can't blame this all on the elk," Mr. Arneson interrupts, "and that point should be made very, very clear. The deterioration of range lands



Many Wenas Valley ranchers resort to sleeping near their hay stacks to prevent losses of valuable livestock feed by marauding elk driven from their ranges by lack of natural winter feed.

occupied by the Yakima elk herd originally was brought about through overstocking and improper management of domestic livestock during World War I. Although the utilization of the ranges by domestic livestock has been drastically reduced, the present deteriorated condition of the grazing areas is being maintained and further aggravated as a result of continued over-utilization by the combination of domestic stock and elk. The

trend of the Forest Service range policies has been to attempt to adjust the numbers of grazing livestock to numbers that can be maintained on a sustained yield basis. No one, however, has been able to control the grazing of the elk."

To get back to the Wenas Valley: Roy Knowles, chairman of the Wenas Valley Soil Conservation District board of supervisors, and other members of that group have not been twiddling their thumbs while watching the elk eat hay stacks and strip the vegetation from the ranges. These men reasoned that their district was organized to protect the land resources of the valley, and the elk, although not originally responsible for their erosion problems, were preventing the farmers and ranchers from fully applying the badly needed, complete conservation program. In order that their range lands might be permitted to recover, it would be necessary to strictly regulate grazing use. The supervisors further reasoned, however, that the most intensive domestic livestock management program designed for the recovery and protection of the forage resources, in the absence of equally intensive elk management, would not solve their problem. Chairman Knowles concluded a meeting called to discuss this matter with the admonition that "something has got to be done!" And something was done.

In 1943, competent wildlife and range techni-



When local big-game populations overbalance their natural feed resources, it is wise management to remove the surplus animals. These three elk from the Wenas Valley provided nearly 1,000 pounds of choice venison to supplement a war-rationed meat supply.

cians made a detailed study of the Wenas Valley elk problem. The factual information obtained from this study served as the basis for a management program proposed by the district's supervisory board to the Washington State Game Commission. The commission hastened to adopt some of the recommendations made by the district. First of all, hunting regulations were relaxed; and, in the last 2 seasons nearly 2,000 of the huge elk went to sportsmen's tables to supplement a war-rationed domestic meat supply. About one-third of this meat came from special hunts authorized in the Wenas Valley.

The second step taken was to divert wintering elk from the farm lands in the Wenas Valley. Feeding yards were established at advantageous points along game trails leading to the valley. Many tons of hay were hauled to these stations. The big Oak Creek winter refuge was established a few miles away, and hundreds of the animals were held in this area. As a final precaution, strong fences were built around haystacks by the Game Commission to protect the ranchers' valuable winter livestock feed supplies.

A problem yet remains on the spring and summer range lands of the Wenas Valley. These areas, of some value even in poor condition, are being destroyed at an alarming rate. The cause—forced overgrazing by domestic stock following the elk, and abuse of the forage resources by elk during periods of improper use. The first cause can be eliminated and the second mitigated. This does not call for a slaughter of the entire Yakima elk herd. The Wenas Valley ranchers do not want that. Recent range surveys have established a winter carrying capacity of about 150 elk in the Wenas Valley. If the elk population in the valley is to be reduced and held to this number, a corresponding reduction must be made in the entire herd.

The impact of grazing on the Yakima elk herd range, if continued at the present rate of use, can lead to only one thing—disaster to the elk, to the domestic stock and to the range itself. The pressure must be relieved. When this has been accomplished, the recovery of the range to normal forage production capacity, and the future profitable use of the area on a sustained forage yield basis for both domestic livestock and elk is assured. And the farmers and ranchers of the Wenas Valley Soil Conservation District can reach their goal—total conservation of their soil resources.

REVIEWS

FOOD OR FAMINE. THE CHALLENGE OF EROSION.
By Ward Shepard. 224 pp. The Macmillan Co. \$3.00.

Few writers on the problems of food and agriculture which confront the modern world have gone so directly to the core of the matter as has Ward Shepard in this book. He does not waste much time on depicting the effects of erosion resulting from the tremendous pressures of industrial society and laissez-faire individualism on the land. This has been done often and well. His basic concern is to show that a veritable revolution is needed in organizing agriculture to cope with the major difficulties of stabilizing food supply and of bringing about the economic and social security of the people on the land. His book deals with the broad outlines of a global attack on our disorganized lands and waters. Moreover, it is unquestionably based on the assumption that half-measures are not enough.

Here we have the much needed challenge to undertake as a whole people an integrated public policy for total conservation. Ward Shepard is thinking in the terms of modern biological principles, and he brings to his writing a rich background of experience both in the Department of Agriculture and at Harvard. He is well aware that "the farmer of the future must be a biologist and an ecologist, not a food mechanic." But he is also quite clear on the fact that our age demands a new educational approach and new social techniques.

Perhaps the most valuable contribution of *Food or Famine* is its analysis of our American experiment in the realm of democratic control of modern technology in the field of agriculture. The meaning of the soil conservation district has seldom been so well defined. The Shepard book conceives it as "the archetype of the coming economy democracy, being at once the answer to the disorganized drift of laissez-faire, and to the lethal coercion of authoritarianism." And certainly its record of adoption and use by the people so far would refute the often accepted idea that the masses of men are too tradition-bound and incapable of making use of the highest technological advances.

The soil conservation district is cooperative social action. Rural people, when uninterfered with by those who would maintain positions of privilege or who fear democratic action, have eagerly responded to this kind of institutional framework. The analysis in this book is thus based upon the assumption that the people themselves, working with scientific technicians, must and can bring about the revolution in land management.

STARTS THE YEAR RIGHT. On December 27 the supervisors of the Waldo County Soil Conservation District, Belfast, Maine, sent a check for \$75 to the Superintendent of Documents, Government Printing Office, Washington, D. C., in payment for 100 subscriptions to *Soil Conservation* sent to a single address. They will be distributed each month to "farmer clients and others in Waldo County."

Moreover, a management plan is the basis of the new thinking about the whole problem. Whether held by a single farmer for enabling him to reach his economic and conservation goals, or by a group of farmers in a district, or by the Nation, it is imperative henceforth, according to Ward Shepard, that "the problem of land management be approached as a whole, and not in the usual fragmentary way. The farm-management plan is the key to and the tool for the scientific reorganization of world agriculture. It is the only means of meeting the farmer's needs for a completely coherent scientific agriculture. It is the only way to protect the general public interest in natural resources. It is the irreducible minimum in reorganizing world agriculture to meet world nutritional needs."

These are positive, challenging statements and perhaps both the fervor and the clear thinking of Mr. Shepard's book will go far toward throwing necessary light on Government policy or educational methods which are based on outworn, nineteenth-century ideas of nature and science. Our times and our knowledge and our problems demand an integrated approach. The small upland watershed, the soil conservation district, the river valley—these are the areas on which the new land-use policy must be based. They lend themselves to community, cooperative action, and river valley authorities like the TVA and soil and forest conservation districts "represent revolutionary administrative concepts in substituting unitary action for fragmentary action in dealing with natural forces and resources."

Moreover, Mr. Shepard is quite clear that if we are to have new techniques of land management we must have a new educational approach. The "extension" or project method is made antiquated by the development of modern science, and by our social and economic needs. It puts a premium on over specialization, and "it has overwhelmingly dealt with single, isolated scientific practices rather than with the whole series of correlated and articulated practices which, combined into a unified whole, constitute scientific management." Certainly we need an education for farmers which will no longer be the doling out of scientific knowledge to a few, and Mr. Shepard has done a valuable service in pointing out the need for a drastic overhauling of agricultural education in terms of the needs of a total and modern land management policy.

This book should have wide reading in Government circles as well as by the public. It lacks, perhaps, some lightness of touch and humor and one is at times overwhelmed by the terrific urgency with which it has been

written. But this is a subject about which there is terrific urgency. There is not as much time, no doubt, as we would like to think, and Mr. Shepard has made this point exceedingly clear.

—P. Alston Waring

TREES, SHRUBS, AND VINES FOR THE NORTHEASTERN UNITED STATES. By George Graves. 267 pages, 68 figures and halftones. Oxford University Press, New York. 1945.

This compact, pocket-sized volume contains a brief discussion of the woody plants, both wild and cultivated, for the entire northeastern quarter of the United States, listed in alphabetical order. It is primarily designed for the gardener, but should prove of considerable interest for anyone interested in the use of woody plants. Issued under the auspices of the Massachusetts Horticultural Society and written by the associate editor of *Horticulture* magazine, the book is authoritative in the fullest sense.

The format is especially good. Measuring 4½ by 7½ inches in size and three-fourths of an inch thick, the book is admirably prepared for pocketing. The plates are profusely supplied and are a credit to author and publisher alike. Common and Latin names are both listed so that layman or scientist can use the book. Altogether one of the best things of its kind so far published.

—William R. Van Dersal

NEW USE FOR CONTOUR FARMING

A brand new benefit has been added to the many known advantages of contour farming.

When Ben Meyer of Red Wing, Minn., planted one field of corn on the contour last year, the rows went out one side of a ridge and came back on the other side in the form of a large "U." While he and the hired man were husking the heavy crops of corn in the fall, a little whirlwind blew up behind the latter's team and started a full-fledged run-away.

Meyer took one look at the fleeing team, cut across the ridge and caught the frightened horses as they came racing down the contoured corn rows on the other side.

"Besides holding my topsoil and saving (wear on) my tractor," Meyer said in reporting the incident, "I figure that contouring saved me the price of a new wagon and a high price harness repair bill."

REFERENCE LIST



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SOIL CONSERVATION SERVICE

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¹ From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Many outstanding farmers include this magazine in their soil conservation program. *Soil Conservation* may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at \$1 per year.



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SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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WELLINGTON BRINK, EDITOR

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Front Cover: Good woodland management is an important part of soil conservation. Woodlands support many kinds of useful wildlife. None is more exciting to hunter, nature lover, or cook than the ruffed grouse. The young birds eat many destructive insects.

PHOTO BY GEORGE C. LOWARY.

SOIL CONSERVATION is issued monthly by Soil Conservation Service of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of \$1.00 per year, domestic; \$1.50 per year foreign. Postage stamps will not be accepted in payments.

CORPORAL ATKINS TAKES OVER

War Hero, Given Farm by Friends and Neighbors, Maps Strategy for Battle of the Land

By T. S. Buie

"Many others have fought for the same things I did. I don't feel worthy, but with God's help I'm going to do the best I can to make this land better."

IN THAT spirit and with those words, Corporal Thomas Eugene Atkins received a deed to the Thank You Farm bought for him by thousands of South Carolina men, women, and children grateful to the Congressional Medal of Honor winner for his heroism on Luzon.

To Atkins, who is modest about the feat that won for him the Nation's highest award, it is like a fairy story that came true. This slender, soft-spoken, 24-year-old hero is a sharecropper's son, and a sharecropper's life seemed in store for him when he returned from the Pacific.

Led by the country doctor who had been family physician to the Atkinses for two decades, by a village banker, and by the wide-awake publisher of the Spartanburg Herald-Journal, the friends

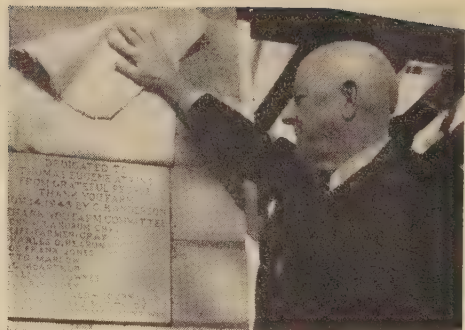
NOTE.—The author is regional conservator, Soil Conservation Service, Spartanburg, S. C.

and neighbors of the war hero bought a farm and built a Mount Vernon style cottage on it for him and his bride.

But the South Carolinians did more than buy 62 acres of land for Atkins. They also helped him to get started on a modern soil conservation farming plan that will keep the land productive from here on out. What Atkins is doing to protect his farm from soil erosion should be an inspiration for other veterans returning to the land. Later, there will be more to say about the way he is transforming a typical, eroding Southeastern farm into a model of soil conservation farming. But first let us tell how Thomas Eugene Atkins, as a member of the famous 32d (Red Arrow) Infantry Division, won the Congressional Medal of Honor.

It happened in the predawn hours of March 10, 1945, on the Villa Verde Trail in the Caraballo Mountains of Northern Luzon—a mighty long ways from Atkins' beloved Blue Ridge Mountains.

Atkins and two companions, in a lone perimeter outpost, were directly in the path of a savage at-



Dedication panel being perused by Chief Bennett.



Farm equipment dealers volunteered to establish the seasonal practices on the land. In this newly terraced field, the land is being prepared for the planting of

small grain in contour strips. These strips will alternate with next year's strips of row crops—cotton and corn. Annual lespedeza will be overseeded on the grain.



Secretary Anderson warmly congratulates the valiant Gene, as he hands over the ownership papers to the young veteran and his bride.

tack launched by two companies of Japanese. The two companions were killed in this first attack, and Atkins suffered a deep flesh wound through his left hip. Although he could have crawled back to the greater security of the main defense line, Atkins held the outpost against heavy and incessant Japanese attack. He fired more than 400 rounds of ammunition—burned out his own rifle and those of his two dead companions.

Only when his ammunition was gone and the three rifles failed to function further, did Atkins crawl back to the main lines—and then to ask for another rifle. Persuaded to have his wound dressed, Atkins was awaiting evacuation when he twice spotted enemy stragglers. He grabbed a nearby rifle, killed one Japanese, and dispersed a second group.

When dawn came, there were 43 dead Japanese in front of the foxhole the straight-shooting South Carolinian had defended so well. His commanding officer, Col. Frederick R. Stofft of Tucson, Ariz., said that “most if not all of them were undoubtedly killed by his expert and heavy fire.”

The Luzon campaign was the third for Atkins. He already was a veteran of New Guinea and the Southern Philippines. That’s the kind of fighter Spartanburg County welcomed home.

When Secretary of Agriculture Clinton P. Anderson came from Washington to Spartanburg County November 14 to present the farm deed to Atkins, more than 1,500 persons packed the Gramling School auditorium, notwithstanding the cold, rainy weather.

It was a program that honored Gene and the other service men from the county. And at the same time, it gave emphasis to the battle for the land—the battle against soil erosion and soil depletion.

John G. Landrum, bank president who served as chairman of the “Thank You Farm” purchasing committee, summed up the purposes of the meeting at the outset—

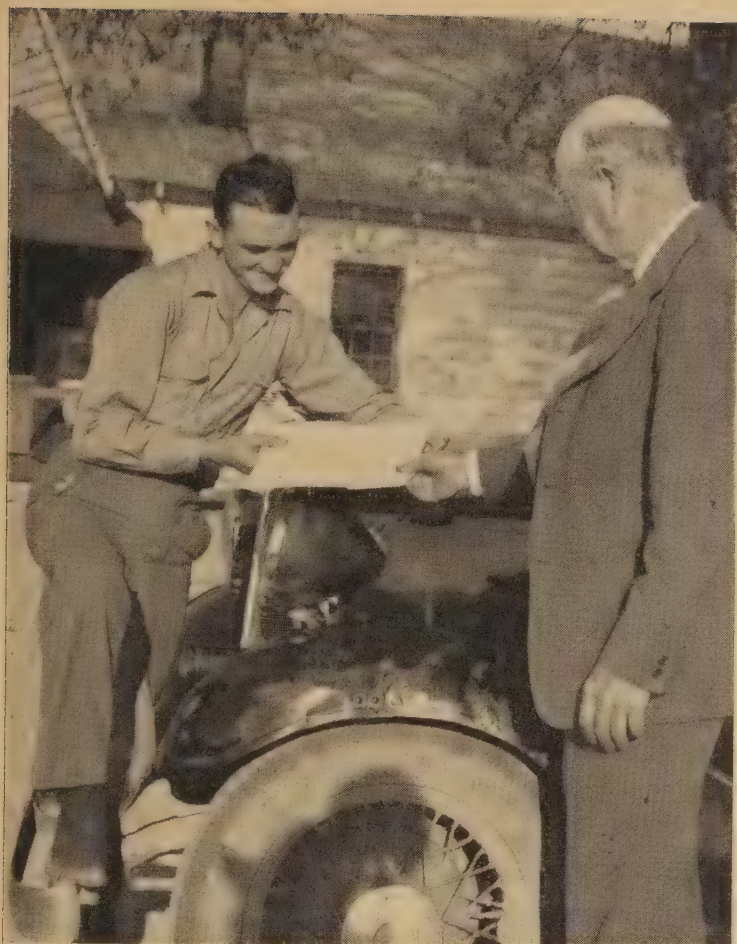
“Corporal Atkins is but a symbol of all Spartanburg County boys. Many others have distinguished themselves, some even making the sacrifice of their lives. Manifestly, we cannot honor all of them this way, but our tribute today is meant for them also. . . . This is also a great day for the farmers of the county. Farm agencies representing the basic interest of the farmer have made their contribution to the improvement of agricultural methods in this region. For this work we are indebted to the Broad River Soil Conservation District and the agencies cooperating with it—the Soil Conservation Service, the Extension Service of Clemson College, the vocational teachers and their students, and the State Forestry Commission.”

When Chief Hugh Bennett of the Soil Conservation Service spoke, he stressed the fact that “this is not our show.” Said he—

“It was Thomas Eugene Atkins, who was too tough for the Japs to lick, who came home with his heart set on farming, and who decided to farm this new place of his the safe, conservation way. It is Atkins, his South Carolina neighbors, and tens of thousands like them in the other 47 States who are going to safeguard our country’s agricultural land from this other enemy—unnecessary soil erosion—and keep it permanently productive.”

The Secretary of Agriculture told Atkins and the audience: “You must continue your great soil conservation work, for according to all signs—unmistakable signs—the South is on the threshold of an industrial-agricultural revolution that may shake its economy right down to the cotton roots on Gene’s farm. . . . Gene, I’m happy as a member of the President’s Cabinet to hand you this deed to Thank You Farm. May God bless you, Gene, as this community has blessed you.”

The war hero replied: “I want to thank Dr. Walden and all those who made this possible. Thanks for making my dreams come true. I’m going to do the best I can to make this land better.”



The farm plan became a part of the cooperative agreement between Atkins and the Broad River Soil Conservation District. It is obvious that the plan thoroughly pleases Atkins and District Supervisor E. C. McArthur.

Dr. A. R. Walden, to whom Atkins referred, is the country doctor who wrote to Publisher William A. Townes of the Spartanburg Herald-Journal:

"Editorials and medals are fine, but they will not help him greatly in earning a living after the heat of war is over. My proposal is for a number of us to show our appreciation by buying him (Corporal Atkins) a home."

Dr. Walden enclosed with his letter his check for \$100. Townes liked the idea, added \$100 of his own money and \$100 for the newspapers to help buy a Thank You Farm. Radio Stations WSPA and WORD of Spartanburg joined the campaign.

Supervisor E. C. McArthur of the Broad River Soil Conservation District read the story about Thank You Farm and offered the services of the district in helping to select and plan the farm for soil and water conservation. Chairman Landrum accepted McArthur's offer, because, as the Landrum bank president expressed it, "We want him to have a good farm, and then to give him all the

help possible in keeping the land and making it better."

As the Thank You Farm campaign started, Atkins was married to Vivian Rollins, the farm girl with whom he used to pick cotton and who had accepted the proposal he had written from the Pacific.

Then Atkins, his bride, and his parents, Mr. and Mrs. Cleve Atkins, went to Washington. There the hero received the Congressional Medal of Honor from President Harry S. Truman and was promoted to corporal. The president told the sharecropper's son, "I'm glad you are a farmer and will have a farm of your own. I was a farmer myself."

By the time Atkins returned from Washington and had received an honorable discharge from the Army, \$7,500 was in the bank for Thank You Farm. Most of the money came in quarters, half-dollars and dollars from individuals who wished to share in honoring a hero.



Working on plans for the big day: Edgar A. Gwynne, left, and William A. Townes, officials of the Spartanburg (S. C.), Herald-Journal.

PHOTO BY MILDRED SCRUGGS.

In the meantime, Soil Conservation Service technicians at the request of District Supervisor McArthur had made soil conservation surveys and land capability maps on all the farms offered for sale to Chairman Landrum and the farm buying committee: Townes, County Agent Joe Frank Jones, Charles O. Hearon of the Herald-Journal staff; Otto Marlow, a farmer, and Cliff (farmer) Gray of Radio Station WSPA.

After studying the colored maps and hearing Atkins say he wanted a cotton, corn, small grain,

and livestock farm, the committee chose a 62-acre farm 6 miles from Landrum, S. C.

Typical Piedmont land, this farm needed a complete soil and water conservation program to keep it productive.

J. H. Talbert, district conservationist assigned by the Soil Conservation Service to the Broad River District, worked with Atkins in making the conservation farm plan, as reported by Hugh Bennett in his article in the January issue of *Soil Conservation*. Careful consideration was given to two factors: (1) The best possible use for each field, as shown by the land capabilities map and (2) the type of farming that Atkins wanted to follow. For example, it was necessary for the farm to produce enough feed for the livestock on the place. Two mules had been given to Atkins by a bottling company. Atkins said he wanted to keep 4 or 5 cows for milk and butter, 3 or 4 hogs for meat, and about 100 laying hens for chickens and eggs.

The best land was planned for cultivated crops—cotton, corn, small grain, and vegetables for home use—but because of the slope and the active erosion, intensive soil conservation treatment was needed. These practices included terracing, a meadow drainageway and other disposal areas to receive terrace water, contour tillage, contour strip crops, and a conservation crop rotation that included annual lespedeza for soil improvement.

Trees will be kept on the steepest land. The woodland, with selective cutting and protection against damage by fire and grazing, will provide all the wood needs of the farm.

Other steep land, which has suffered extensively from erosion, can be used for hay and grazing. These areas will be planted to two perennial legumes, sericea lespedeza and kudzu, widely used in the South for erosion control, soil improvement, and forage.

The best pasture land on Thank You Farm is low and wet. It will be cleared of worthless trees and brush and planted to grasses and clovers.

Even wildlife conservation is included in the new farm plan. A 30-foot border between the woods and the cultivated field—an area where crops usually fail because of shading and sapping by the trees—will be planted to sericea and bicolor lespedeza to give food and cover to small game.

There was one other thing that Atkins told Talbert he had his heart set on—a fish pond. At one end of the grass-clover pasture, they found

an ideal site for a 1-acre pond. When properly stocked with fish and fertilized, this pond should supply 200 to 250 pounds of good eating a year—as well as a lot of fun.

By the time Secretary of Agriculture gave the deed to Thank You Farm to Atkins, most of the practices that could be placed on the land during the fall of the year had been established. Farm equipment dealers and agricultural agencies cooperating with the Broad River Soil Conservation District built the terraces, sowed small grain in alternate contour strips, shaped and seeded the meadow drainageway, set pine seedlings in the cut-over woodland, planted kudzu, prepared the wildlife border, and sloped the road bank for a 15-foot border strip to be planted to sericea lespedeza.

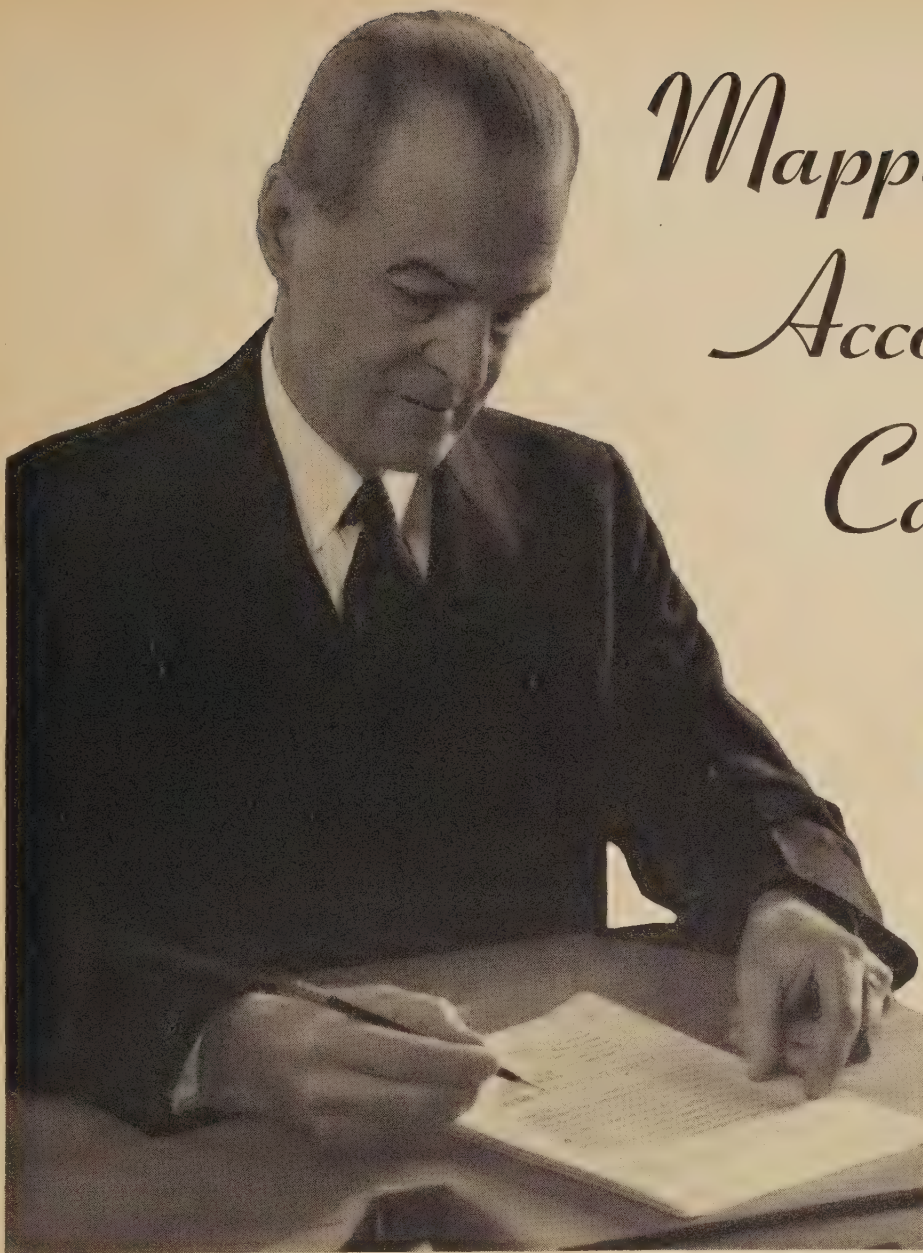
As Landrum explained, “We have given Atkins a farm and we have helped him to get started on a soil conservation program that will keep the land productive. Because every one will watch the way he farms his land, we believe that his soil conservation farming will be an inspiration and a demonstration for all the other farmers of our section.”

The technical help Atkins had in planning his farm for soil and water conservation is now available to veterans—to all farmers, in fact—in more than 1,260 farmer-organized soil conservation districts that cover almost 700 million acres in 45 states. The districts are not in a position to get the practices established, as Broad River District did in the special case of this war hero, and the farmers themselves do the work. But AAA payments help to pay for the establishment of many of the measures. County agents, vocational agriculture teachers, and Soil Conservation Service technicians can tell veterans how to get in touch with their district supervisors.

And when veterans start soil conservation programs on their lands, they will be defending their country as surely as they did when they fought to protect it from foreign aggression. That's what South Carolina's Thomas Eugene Atkins is doing on Thank You Farm. Moreover, he expects to increase acre yields by at least 34 percent. Other South Carolina farmers have reported such an increase as a result of soil conservation.

Dr. H. W. Reuszer, soil scientist in research, Soil Conservation Service, Auburn, Ala., has received the OSRD Certificate of Merit for studies relating to deterioration of military equipment by tropical bacteria and fungi.

Mapping the Land According to Capability



**By Dr. Firman E. Bear
Chairman, Soils Department
New Jersey Agricultural
Experiment Station**

Dr. Bear

THE Soil Conservation Service is now in the process of resurveying the soil resources of the Nation in terms of what is known as land capability. This paper has to do with the meaning of this term and the use to which the information gained by such a land classification can be put.

The soil conservationist is concerned not only with the tremendous over-all problem of conserving our land resources but also with the very pressing problems presented by soil erosion on individual farms. In developing the conservation program it soon became apparent that the original soil surveys which had been made on a 1-inch-to-1-mile basis, were inadequate to meet the requirements. A more detailed map was needed that would show not only the distribution of all the important soil types, but would indicate the slope of the land and the kind and degree of erosion that were involved. Accordingly, a resurvey is now being made on a 4-inch-to-1-mile basis, which means multiplying the older map area 16 times.

Soon after this resurveying program got under way it became apparent that it provided an op-

NOTE.—This paper was presented at the Third Annual Conservation Conference, held under the auspices of the New Jersey State Soil Conservation Committee, Medford Lakes, N. J., October 9, 1945.

portunity to break the generalized soil types down into smaller units that corresponded more nearly with the farmer's experience in dealing with the several parts of his individual fields. At first the tendency was to differentiate the soils into as many

units as could be detected by field inspection, no matter how small the differences might be. Now, however, the survey is being based on only those factors that appear to be of considerable importance in differential practice. Even so, the resurvey is giving us from three to four times as many soil types as were mapped in the original survey. Furthermore, as would be expected with the passage of time and the gathering of more information about the soils of the several States, some of the original series names have had to be replaced with new ones that are more in conformity with usage in other areas.

The multiplication of the number of soil types presented complications for men of limited memories, even when considered for a single county. But this was a relatively minor problem when compared with the one that developed when 6 classes of slope and 10 classes of erosion were introduced into the scheme. Thus the magnitude of the memory problem had been multiplied at least 200 times.

In order to overcome this difficulty it became necessary to group the various factors that determined the seriousness of the conservation problem into more practical units. Thus, two fundamentally different soil types, when considered in relation to their slope and erosion classes, often fell into the same conservation category. By continued study of this problem it became apparent that all soils could be grouped into a relatively small number of land-capability classes. The classes that were to be differentiated ranged from the most widely adaptable one, in which the land was so favorably situated and of such quality that practically no physical problem in land use by cultivation procedures was presented, to the worst one, in which the land was considered unsuited for anything except what a protected nature would provide.

In accordance with this concept, all land is now being placed in one of eight land-capability classes. Of these, seven classes fall into two major groups, the differentiation between them being made on the basis of their suitability for controlled cultivation. The division into classes within the group is based on the ease with which erosion can be controlled. Selecting the slope factor as an example, land in group A, classes I, II, III, and IV, would normally be described as flat, gently rolling, rolling, and hilly, respectively, and that in group B, classes VI, VII, and VIII,

would be described as steep, mountainous, and cliffs (or swamps), respectively. Range land has been set apart from the others and designated as class V.

Once a farm is mapped in accordance with these land-capability classes, the farmer and his advisors are then in a position to plan a forward-looking program. In border-line cases, however, it may be necessary to go back to the field in order to determine the seriousness of the risk of endeavoring to utilize the land for a farming program that calls for more cultivation than is deemed advisable for that class of land. Thus, length of slope, roughness of topography, and exposure to wind are not shown on either the land-capability maps or on the soil survey maps which the land-capability colors overlie. The technical man, of course, can read a great deal more on these maps than the untrained.

In general, the greater the amounts of class I and class II land on a farm, the more intensive the farming enterprise may be, and the greater the permissible expenditure for machinery and labor. In proportion as more class III and class IV land is found on the farm, the more extensive the agricultural enterprise would normally be. In other words, land values and acre-incomes tend to drop and larger land areas are necessary for adequate labor incomes in the higher-numbered land-classes.

The mere fact that land is placed in one of the higher classes, however, does not mean that it is ruled out as to potentialities for profitable farming. In fact, the possibilities are quite the contrary for men of adaptability. An example of the realization of such possibilities is provided by a well-known New Jersey farmer who is now operating, in an adjoining State, some 2,000 acres of land belonging largely to classes IV, VI, and VII for raising heifers for dairy-herd replacement, for growing Christmas trees, and for the production of timber.

These three enterprises operate on three different time schedules, the heifers moving into milk production at about 27 months, the Christmas trees going to market on an 8- to 10-year schedule, and the timber requiring from 35 to 40 years.

More specifically, this enterprise is based on the stated policy that no large area of land will be added to the present holdings if it has important potentialities for cultivated crops. Operating on

that basis, most of the land has been purchased from about \$7 per acre, without buildings, to around \$15, with buildings. A recent acquisition, consisting of 160 acres with an excellent frame house, a good barn, and several fair outbuildings, was purchased for \$2,500, or a little over \$15.50 per acre. The reason this land can be purchased at such levels is apparent, in that it indicates that the use to which it had previously been put was not a profitable one.

Having purchased such a farm, the class IV and some of the class VI land is set aside for hay and pasture, and the remainder of the class VI and all of the class VII land is put into trees. The cost of producing Christmas trees on such land is estimated at \$300 per acre, over a 10-year period, and the selling price of 2,000 trees per acre, out of 2,500 that were planted, at \$1,000 per acre, at the end of a 10-year period, giving a net return of \$700, or \$70 per acre per year.

This discussion naturally leads to a consideration of two very important points, one having to do with the uses to which land-capability maps can be put, and the other with the problem of education of the public toward improved use of land.

Considering first the possible uses of land-capability maps, it is readily apparent that they have great value both to the farmer and to those who advise him. But it is well to keep in mind that they will ultimately be widely used in farm real-

estate transactions as the basis for evaluating the potentialities of the land for the purposes the new owner has in mind. Thus the first thing any man who wants to buy a farm should do is to go to the soil conservationist's or county agent's office and examine the land-capability map of that farm. But land-capability maps will also find highly important uses in evaluating land for taxation, for credit purposes, in condemnation proceedings, when damages are incurred as a result of highway construction or other public improvements, and for a great variety of other purposes. One cannot contemplate these possibilities without realizing how much depends upon having this job of classifying land according to its use-capabilities rightly done.

The second problem, that of educating the public to the end that profitable use is made of all land, is of even greater importance. Thus we need not only to conserve properly the better cropland, but also to open up the minds of men to the long-range potentialities of land for forest, recreational, and game purposes, all of which enterprises can be made to stand on their own feet. It is my considered opinion, growing out of a careful study of what the Soil Conservation Service is doing in the way of mapping land as to its use-capabilities, that this is one of the most far-reaching enterprises in its potentialities for public good that has ever been undertaken in this country.

FROSTED KUDZU

By B. H. Hendrickson

ACCORDING to preliminary chemical analyses made of a full growth of kudzu collected as hay just before frost, kudzu is high in fertilizing value. It is rich in nitrogen and contains considerable phosphoric acid and potash. O. W. Beale's analysis, made at the Conservation Experiment Station laboratory at Clemson, S. C., in 1945, of sample sent to him from this Station, was partly as follows:

Nitrogen.....	3.18%
Phosphoric Acid.....	.54%
Potash	1.00%

On average land, a full season's growth of well fertilized and well established kudzu produces in

NOTE.—The author is project supervisor, Southern Piedmont Conservation Experiment Station, Soil Conservation Service, Watkinsville, Ga.

excess of 5 tons per acre of air-dry hay. This does not include the large vine runners close to the ground, which root at the joints. On this basis, 10,000 pounds of kudzu hay contains 318 pounds elemental nitrogen, 54 pounds of phosphoric acid, and 100 pounds of potash.

By comparison with commercial fertilizers, this is equivalent to one ton of nitrate of soda at present prices costing \$38.50, 300 pounds of 18% superphosphate worth \$2.75, and 165 pounds of 60% muriate of potash worth \$4.00—or a total fertilizer value of over \$45.00 per acre.

After weathering in the field until the following March, the kudzu residue or "frosted kudzu" analysed as follows:

Nitrogen.....	1.78%
Phosphoric Acid.....	.46%
Potash	.12%

In other words, the smaller portion of the kudzu remaining on the land in March still was over

half as rich in nitrogen. It was four-fifths as rich in phosphoric acid, but had lost seven-eighths of its potash.

Kudzu has been called a "nitrogen factory." The high nitrogen content of the hay is mainly in the form of protein—the most valuable of all the feed nutrients. During the winter months, some of this important feed constituent undergoes decomposition and is lost by leaching from heavy winter rains.

Since frosted kudzu has a high feed value, it

is a good practice to graze it off during the winter months and thus conserve some of the nitrogen which would otherwise be lost through leaching. It supplies a large volume of palatable dry roughage, readily eaten by dairy and beef cattle. The moist leaves and litter in contact with the ground decompose first, leaving ample rich residue on the ground after grazing to protect it from erosion and improve its fertility, in addition to the added fertility derived from manure dropped by the cattle.

DISTRICT PROFILE

PERCY PERRY, OF KANSAS

WHEN it comes to discussing soil and water conservation, Percy Perry holds his audience with the eloquence of a Chatauqua speaker. And this interest is well founded. Mr. Perry, a member of the Rice County (Kansas) Soil Conservation District Board of Supervisors has had nearly half a century of farming experience. His life has been full and eventful, serving the farmers in Rice County. Born and raised on a farm in the Little River community of Kansas, he started farming his own 160 acres at the turn of this century. In 1911, he was graduated from the Bible Department of Washburn College at Topeka. From there he went on to the Chicago Theological Seminary. Completing his study for the ministry he served as a pastor until he entered the Army in 1917 and went overseas to France. After he was honorably discharged in 1919, he went into the grocery business near home. But all through this period he kept in close contact with his farm, renting it out first, and then farming it himself in connection with his other business. Perry sold his grocery store in 1935 and since then has been devoting all his time to his farm except when occasionally called on to serve in the local pulpit.

It was also in 1935 that Perry noticed the severe erosion taking place on his land. He got in touch with the county agent, M. M. Taylor, who is in the Soil Conservation Service. He wanted to know how to stop the gullying in one of his fields. Terracing was one of the first suggestions made by Taylor. Although no terracing had been done in



Perry, of Kansas.

Rice County prior to then, Perry was willing to take a stab at it. Taylor laid out the lines and the terraces were constructed with a small grader. They were narrow and had sharp ridges. Although they were not liked too well by Perry, they served the purpose for which they were built,

controlling erosion on the field. During the past few years these terraces have been reworked to broad-base specifications, which Mr. Perry likes much better, and which are easier to farm across. Other terraces have been added to the original ones.

"Ten years ago we didn't know too much about terraces or terrace outlets," Perry comments. "We've learned a lot about them since. The first outlets I built didn't have a cover of grass and gave me some trouble. But that has changed. I now have plenty of grassed waterways providing adequate outlet for the water.

"For 17 years prior to conservation farming wheat yields averaged 12 bushels to the acre. Terracing and contour farming on 150 acres, in recent years have brought the yields up to 22 bushels per acre."

Mr. Perry at present owns 560 acres, 3 miles north of Little River. He worked out his farm conservation plan with the help of Soil Conservation Service technicians. It calls for terracing and contouring of an additional 175 acres, the balance of his cropland. He uses sweet clover in rotation on this land, seeding one-fifth of the cropland to legumes each year.

"It takes a little more time to farm on the contour with terraces but you save a lot of soil and water that way. And you save the necessity of replanting crops. The increased yields more than compensate."

Some of Perry's eroded acreage has been taken out of cultivation and seeded to grass. He built a stockwater pond in his 160-acre pasture and has a crop residue management program.

"Conservation farming has helped me produce the best crops I've grown on this farm in the past 40 years," Perry added. "It isn't what a fellow *says* about soil erosion and conservation, it's what he *does* to control soil losses that counts.

"The real issue at stake everywhere is this: Shall this be a prosperous community or a poor one? Financial, social and political stability of a community directly depend on how well the soil is taken care of. We have two roads to follow, one of protecting the soil and maintaining a prosperous community, or one of neglecting the soil and some day winding up on the ragged edge.

"Soil is basic. For a long time we did not realize it. If soil erosion is allowed to continue, it will permanently damage us all both economically and socially. Our descendants in genera-

tions to come will find the struggle for a livelihood increasingly difficult."

This same philosophy was behind Perry's help in organizing the Rice County Soil Conservation District in 1943. He showed avid interest and helped organize the district, which he described as, "an organization set up to help farmers with their erosion problems and, in turn, help the community."

Mr. Perry also has emphasized the way conservation farming helps control the high crests of flood, saying "The only permanent long-time solution of this flood problem is to hold the water on the land where it falls. That should be followed with small dams and reservoirs with the idea of developing these facilities for recreation and recharge of ground water."

With his years of farming experience and deep devotion to whatever will benefit Kansas agriculture, Percy Perry supplies an example of the sort of farm leadership that is doing so much to spur the work of soil conservation districts in the midwest.

SOIL DETACHMENT AND TRANSPORTATION

By W. D. Ellison

A CERTAIN definition of soil erosion has always seemed helpful to me in the study of soil erosion problems. This definition appeared in the September issue of *Soil Conservation*, in my article "When Raindrops Splash." It stressed the fact that soil erosion consists of two distinct processes. There are "(1) displacing or tearing the soil loose, and (2) transporting the soil material." Substitute the word "detach" for the phrase "displacing or tearing the soil loose." Your definition then will read: Soil erosion is the detachment and transportation of soil materials by erosive agents. The erodibility of a soil by water will then depend on (1) those properties that cause it to resist detachment by water from the soil mass, and (2) those properties that affect its transportation by water.

The resistance to detachment of particles from the soil mass will depend mainly on the soil's cohesive properties. A soil that has a high clay content may have strong cohesive properties.

NOTE.—The author is assistant chief, division of drainage and water control, Soil Conservation Service, Washington, D. C.

(Continued on p. 190)

Growing Pains of Pond Management

By VERNE E. DAVISON



The "big one" is an occasional reward, never dependable.

THERE are dozens of ways to mismanage fishing waters and, with little exception, those wrong technics are more complicated and more difficult than the few essential practices which produce good fishing.

During the period of a single year, July 1, 1944, to June 30, 1945, it was my privilege to approve applications for fish for 1,374 ponds whose owners were encouraged in pond management for fish

NOTE.—The author is chief, regional biology division, Soil Conservation Service, Spartanburg, S. C.

by soil conservationists in the Southeastern Region of the Soil Conservation Service. I wish I could say, "Those 1,374 ponds will demonstrate successful fish management"; unfortunately, at least three or four hundred of them will not provide the owners with good fishing until they manage them properly.

We've been studying dozens of ponds that were constructed, stocked, fertilized, fished, and otherwise managed as a part of the soil and water conservation activities of farmers who are cooperators in soil conservation districts. Soil conservationists have had their doubts relative to this or that technic recommended by the regional biologist. That's reasonable—they're entitled to doubts until they have living proof in their own work territory; but the time for mistakes and doubt has just about run its course in the Southeast. Almost every technician who began pond work as long as 2 or 3 years ago, now has one or more disheartening examples to compare with more recent successes.

Introducing a new set of water management technics certainly has its trials. Our technicians encounter the full barrage of questions and arguments about fish management—for old ponds as well as new. A few folks honestly admit, "I don't know anything about managing fishing waters, but I like to fish." You would think, however, from the freely given advice handed out over the counter and from the barber's chair, that a fishing license is generally regarded as a permit for the professional practice of fish culture.

I could not understand the confident manner in which a fisherman walked up to a pond and gazed into its crystal surface (not unlike a crystal ball) and prescribed "a couple of new water weeds, more brush piles, some gravel beds, eight or ten thousand more hatchery-raised fish, a longer closed season, a 13-inch instead of a 9-inch minimum size limit for bass; and a ton of manure and a bushel of daphne at 2-week intervals." Nor can I figure out

how the same person weighing up potatoes at the store came to suggest, "I'd put some crappie and catfish and top minnows and northern pike in that pond" to the farmer who simply remarked "fishin' ain't no good no more."

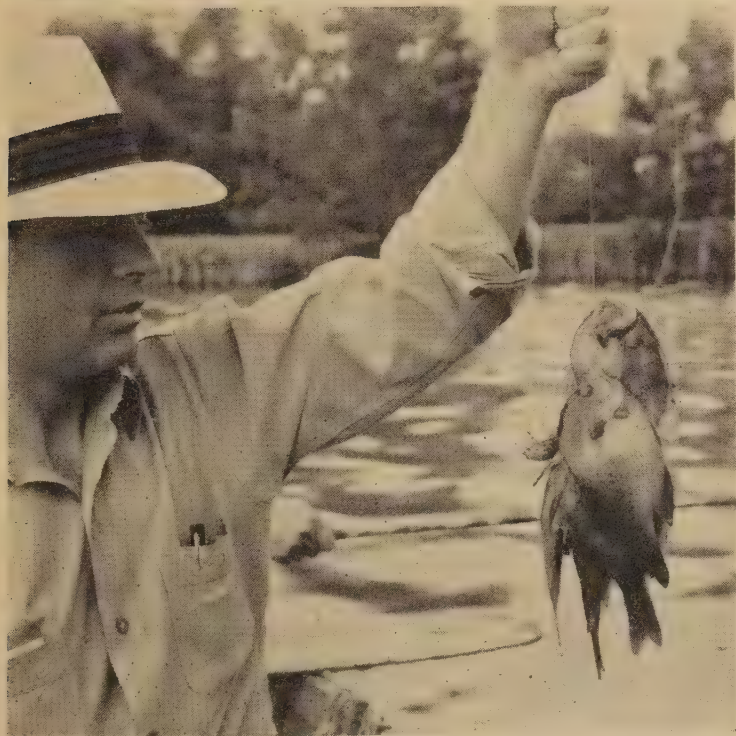
It's been fun to dip a minnow seine in the shallow edges of hundreds of ponds from Virginia and Kentucky south to Mississippi and Florida; and show the surprised owners and our own technicians the simple, easy ways to tell what most ponds need in management. Few people really know what conditions exist within their ponds. Everyone seems concerned to protect the little fish

from snakes and birds and turtles and bass and the so-and-so who would take anything less than the "big ones." But if there's pleasure in success, there's balancing heartbreak in the failures. If I have failed to find every way in which a pond can be mismanaged, it's probably because I'm only 42 years old. Nevertheless, I am confident I'll see more ways and hear more owners say, "I didn't know. My best friend told me to do it. What can I do now to correct it?"

Offered here is a list of 5 essential things that must be done to have the best fishing in farm ponds. Following these are noted the 16 com-



Ponds in streams are not suitable for fertilization.



A string of medium-size bluegills wins the admiration of all but the size-hungry.

monest practices which at best are an unnecessary waste of effort; while the worst of them will ruin fishing in any pond.

1. It is essential to begin with approximately 100 bass and 1,000 to 1,500 bluegills per acre. A few adults won't do, and no other kinds of fish can be managed very successfully, according to present experience.

2. It is essential to fertilize pond water. Submerged water-weeds and mosquitoes can thus be kept out. Fertilized waters produce a heavy yield of fish, and make fishing more successful. Between 500 and 1,500 pounds of 8-8-4 chemical fertilizer will be required per acre annually.

3. It is essential to protect a pond from becoming muddy and from excess water. Silt prevents economic fertilization; and, since pond management is chiefly water management, a farmer finds fertilization a hopeless task if the pond contin-

ually refills with fresh water and washes out that which has been fertilized.

4. It is essential to maintain a pond free from weeds, grass, brush, trees, and other debris or obstruction. Fishing is more pleasant and more of the fish will be in usable sizes.

5. It is essential that the pond be fished—removing usable fish by hook and line fishing—without regard for spawning season, size, kind, or numbers. The number of pounds removed will govern the number of pounds produced as the food, formerly consumed by those caught, becomes available to those remaining. The fish themselves will limit the anglers' catch, leaving a big margin of safety in breeding stock.

To summarize: *These five essentials will produce excellent fishing without any other measures. To make each pond manageable requires a little common sense when selecting sites and constructing the reservoirs. Management requires a reasonable amount of work and expense to apply fertilizer and control vegetation around the pond edges. It is important, therefore, that effort and thought be concentrated on the essential things—and not dissipated on the unnecessary or incorrect practices, several of which are listed as follows:*

1. Stocking a well fertilized pond with less than 100 bass per acre is wrong. Any southern pond without bass is no good. Stocking with adult bluegill in numbers substantially below 1,000 per acre is wrong (if the pond is to be well fertilized).

2. Stocking ponds with crappie, catfish, or any species other than bass and bluegills is not likely to produce continuous fishing. No combination is as simple to manage as bass and bluegills. Experimental results have proved no combination of fish as successful as these two.

3. Brush and trees in a pond neither increase the fish nor make fishing better.

4. Sand, gravel, or rock piles for spawning are entirely unnecessary. Pond fish will spawn adequately without them.

5. Addition of golden shiners, gizzard shad, top minnows, and other "base food" is unnecessary. The small bluegills and bass provide adequate food and will eat all mosquito larva in weedless ponds.

6. Screens across spillways are dangerous and largely unsuccessful. Little fish washed out even in great numbers are of no consequence—there will be that many more produced. Large fish go out only with deep flows through spillways—a condi-

tion avoidable by making wide spillways that spread the overflow thin (no more than 3 to 6 inches deep) and by avoiding flood waters, either by diversion ditches, or still better, by selecting sites on small watersheds.

7. Kingfishers, herons, fish ducks and other birds have no material influence on fish in farm ponds. They eat only little fish of which every pond will have plenty. Only in hatcheries where thousands of fingerlings are kept in relatively little water are such birds undesirable.

8. Planting of water lilies, mosses, or other water-weeds is of course detrimental. More fish are produced in weedless ponds than in those that are weedy.

9. Running water to "keep it fresh" is unnecessary. The plant and animal life together with the sunlight maintains a healthful condition for fish, livestock, and people even in waters remaining without "fresh" water entering.

10. Leaving stumps or putting wire, posts, broken glass and other impediments in ponds to "prevent some so-and-so from seinin' all the fish out" makes wading, swimming, and fishing unpleasant. Very few ponds can be seined heavily enough to reduce the brood stock substantially. Depth is usually sufficient guarantee against harmful seining.

11. Draining a pond down to "dry it out for weed control" is not successful. Weeds that live beneath the surface can be killed and kept out with shade resulting from the dark green coloration of fertilized water; the roots of water-lilies can be exhausted by cutting the leaves as they reach the surface of the water (several cuttings are necessary as exhaustion proceeds slowly); and cattails and similar "edge-weeds" can be kept under control by pulling them occasionally as they appear. Bluestone (copper sulphate), calcium arsenate, and other chemicals are less desirable for weed control as some weeds are not harmed substantially, chemical poisons kill fish foods too, and the "successful" results are but temporary.

12. "Feeding" with stale bread, grain, or other foods is less efficient than fertilizer, and contributes little to the poundage of fish when fed in the small quantities usually given. Five or ten pounds of such foods will probably produce 1 pound of fish—to add to the 500 pounds per acre supported in fertilized water.

13. The use of manures, cottonseed meal, hay, or other organic fertilizers is not so successful or

productive of fish as inorganic chemical elements. Organic materials support the undesirable pond scums.

14. Closed seasons or "protected areas" are quite unnecessary in conservation of pond fish. In fact, the spawning beds of bluegills should be located and fished heavily if a high yield is to be harvested. It is foolish fear to refrain from catching fish whenever they will bite.

15. It is not necessary to fish the bass and bluegills in proportion to the original stocking for the purpose of keeping a balance. The bass will maintain a correct balance whether the owner takes only bass or only bluegills. To enjoy full use and to harvest the usable surplus, however, both bass and bluegills should be fished; the pos-

sible yield is approximately 3 pounds of bluegills for every pound of bass.

16. A narrow belief has been built up by contests and sports-lore that "catching the big ones" is the foremost (and, to some, the only) objective of fishermen and fish producers. To a size-hungry fisherman, one should suggest the Gulf of Mexico or either of the two oceans bordering the United States. Now that pond owners know how to produce more fish it is time to recognize as "master fisher" those who can produce the most pounds of fish per acre, and catch delightful strings of fish frequently. Most people like small pan fish, and like to catch them, too, if the brag-gart and the contest winner don't bully them into embarrassment.

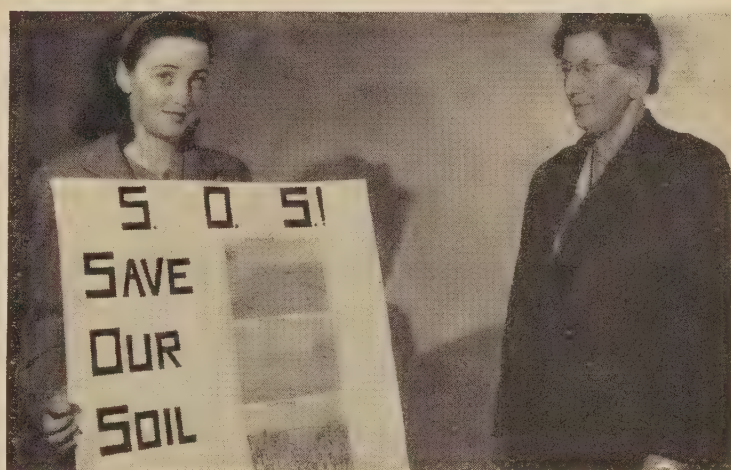
THIS COUNTY SUPERINTENDENT IS A SOIL CONSERVATIONIST

By Oliver J. Muser

FARMING may be considered a man's game, but Miss Ollie M. Swanson of Sparta, Wisc., has proved that the horny-handed sons of toil have no monopoly on it. She has also demonstrated beyond a shadow of doubt that women can do a lot to advance the cause of soil and water conservation. The war gave her the opportunity.

When the county superintendent of Monroe county entered the armed service, Miss Swanson took over his job to pinch-hit as acting superintendent for the duration. She was already interested in conservation and had a complete farm plan on her own land. For that reason, Howard C. Hass, Ernest Dupuis and Raymond C. Schenk of the county soil conservation district had no trouble interesting her in a conservation program among the county schools.

But let Miss Swanson tell her own story: "We, as a nation," says Miss Swanson, "vividly see the necessity throughout the country for the establishment of soil conservation practices on the land. We, here in Monroe County, too, saw the necessity of a well-planned educational program in our rural schools. The fact that farm land is being



Janice May Hall, of Portland Center School, won a soil conservation poster contest. Miss Swanson here views her work with satisfaction.

rapidly depleted of topsoil has been an incentive for soil conservation study in schools. We realize that if we are to continue as a prosperous county the future as well as the present farmers must become soil conservation minded. Too, over 90 percent of the people in Monroe County derive their income from the soil.

"Since the local Monroe County Soil Conservation District office has been established, a large number of farmers in all parts of the county have

NOTE.—The author is assistant in education, Division of Information and Education, Milwaukee, Wis.

taken advantage of the splendid service being offered by the conservation office personnel, Messrs. Howard Hass, Raymond Schenk, and Ernest Dupuis. As a result of seeing conservation practices established on the land, the boys and girls have become interested in studying about soil conservation practices such as strip-cropping, contour farming, gully control, reforestation and pasture renovation.

"In planning the spring science work unit for Monroe County rural schools, my assistants and I included a unit on soil conservation. In preparing the unit we sought the advice of the technical specialists from the Monroe County Soil Conservation District. We held several meetings to plan our future activities. It was decided to supersede this study by holding two series of meetings, one for the teachers and the other for the students.

"An effort was made to concentrate on the teacher meetings as 'schools of instruction' to present to the teachers a systematic study of the technical information then relating to conservation. Mr. Schenk presented an illustrated lecture showing colored slides made in Monroe County which covered all phases of a conservation program. Both Mr. Hass and Mr. Dupuis discussed those phases in which they were most keenly interested. A sound movie, entitled *A HERITAGE WE GUARD*, was presented at the beginning of each meeting to familiarize the teachers with the overall importance of soil conservation.

"After the lecture a round table discussion was held between teachers and the personnel presenting the program to clarify any points still in doubt. Many personal examples were cited by the teachers of the work, either on their farms or nearby farms, that are already showing demonstrable returns from the past few years of service given them by the Monroe County Soil Conservation District.

"At the close of the meeting the following materials were distributed to each teacher, who in turn added these articles to the school library: Zeasman and Clarke's Outline, 'Save the Soil' and a bound book consisting of 17 USDA booklets of the most current material available in the various specialized fields of conservation.

"The teachers felt it necessary to have soil conservation as a truly integrated unit. With the helps given, they could plan every class and subject around this formative area of learning. For example, in art the children could express in pic-

ture form what they had learned in their conservation course as well as in other class subjects.

"At one of the supervisors' meetings of the Monroe County Soil Conservation District was decided, as an added incentive to the children, that a poster contest would be held and that prizes would be given for those which best portray the theme of soil conservation. The winning posters were displayed later in local store windows of each community to acquaint the people with the work being done in the rural schools by the future farmers in Monroe County.

"The second as well as the first series of meetings was attended by over 99 percent of teachers and upper grade students. The series for the students was aimed toward presenting a general picture of soil conservation through the use of several movies. At each of these meetings Mr. Hass ended the program with a short guessing contest, using the letters in *SOIL CONSERVATION* to evaluate the benefits derived from the evening's meeting pertaining to conservation. It was gratifying to note the keen interest that was shown by teachers and students who attended either of the two series of meetings.

"At the close of the unit there was a culminating activity in each school which included the parents of the community.

"Those of us who had been instrumental in establishing this program in our rural schools already have witnessed pleasing results. All of us connected with the program dedicate ourselves to the development of an appreciation of soil and moisture conservation in the public schools. The job becomes easier because of the wildfire-like, spontaneous way in which the children are adopting it."

With Miss Swanson's story in mind it is not difficult to understand the enthusiasm which greeted this science unit.

Various culminating activities were planned, including a special program which was presented for the benefit of the Monroe County School Board at its meeting in May. At this meeting the 111 contest posters were exhibited. An original play written by the pupils and teacher of Enterprise School entitled "Conservation Helps the Bartletts" was also presented. In this play a keen sense of the value of soil conservation and its human relationships was ably depicted. This meeting afforded an excellent opportunity for some who had written essays to present them publicly. All in all, the



In this pleasant farm home in Pleasant Valley, near Sparta, Wis., lives Miss Ollie Swanson, who is responsible

school board members of this Wisconsin county have good reason to feel proud when they contemplate the soil conservation achievements of their rural schools.

Fifteen cash prizes, ranging from \$5 to \$1, were presented to the winners of the poster contest. Top honors and \$5 went to Janice May Hall, a pupil of the Portland Center School; second place and \$4 were awarded Duane Patterson, Elmwood School; third place and \$3 were taken by Betty Stark, Central Point School, Wilton; and fourth place and \$2 were presented to Beverly Downing, Lower Brush School.

One dollar awards were won by each of the following: Elmer Gernetzka, Jr., Walters School; Donald Shird, Lower Brush School; Bonnie Shird, Lower Brush School; Delores Becker, Hillcrest School, Wilton; Charles Beller, Diamond Valley School, Camp D; Audrey Schenk, Enterprise School; Hazel Lemon, Hill School; Harold Paddock, Paradise School; Lola Creviston, Central Point; Bernice Livangood, Jenkins Valley School; and Jeanette Uselman, Dorset School.

In conclusion, it might well be reemphasized that this program was the result of cooperation

for opening to the school children of Monroe County new vistas of opportunity for full living on the land.

between educational leaders and the Soil Conservation Service. By mutual assistance they are striving to save for themselves and for generations yet unborn the precious heritage of soil. Miss Swanson, through her interest and her activities, has proved that county superintendents of schools are vital links in promoting soil conservation education.

DISTRICT TO MANAGE TAX-DELINQUENT LAND

All tax-delinquent land in Huerfano County, Col., that cannot be sold will be turned over to the Upper Huerfano Soil Conservation District.

The plan was agreed upon at two joint meetings of the district supervisors and county commissioners, and will return to the county tax rolls approximately 36,000 acres of land that has yielded no taxes for two or more years.

The district will attempt to increase the land's productivity through erosion control and better land use.

Supervisors of the Upper Huerfano District are W. P. Garritson, president; T. M. Hudson, vice president; Ernest Wadham, Alton Tirey, and Damasco Vijil.



One example of the effect of Hubam clover on crops on the Texas Blacklands. The corn on the right—fifth successive crop of corn on the same land—is but shoulder

high on an average man. That on the left, grown in a 2-year rotation with Hubam, is a foot taller than an average man can reach.

Hubam Takes the Texas Blackland

By W. M. NIXON



Deep in a pasture of Hubam clover and Johnson grass.

BLUE lupine has been toasted in the Old South as a queen of conservation. In the Midwest, bromegrass is heralded as a soil-improving handmaiden of farm conservation planners. And crested wheatgrass has given a lift to thousands and thousands of tired acres on the Western Plains.

Now comes Hubam clover, to take over as the high-stepping drum majorette of conservation in the famous Blackland section of Texas. A relative newcomer, this legume—an annual variety

of white clover—already has the spotlight and is fast taking the uplift role in crop rotations all over the area.

Any way you look at it, Hubam clover does yeoman service in putting new life into farming on the tight, crusty Blackland. It mellows the soil and lets it drink in more water. It makes the land more resistant to erosion and easier to work, boosts crop yields immensely, and produces top-grade pasture, hay and seed cash-crops. It helps cotton over the root rot hurdle. It is a natural in 2- and 3-year soil conserving and improving crop rotations. And it pays its own way, however it is used.

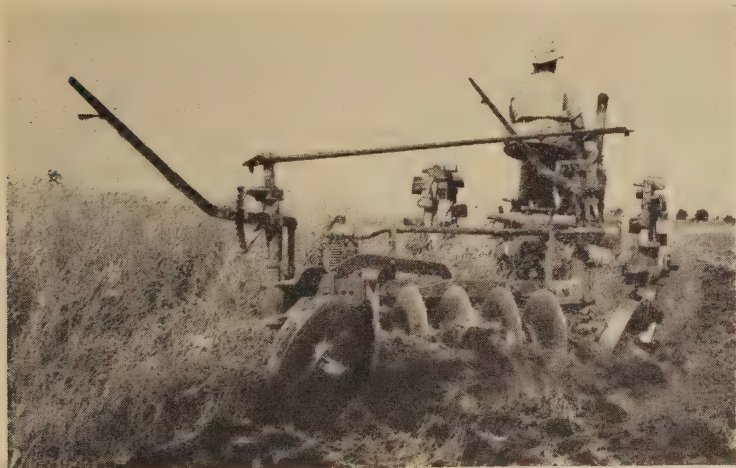
NOTE.—The author is chief, agronomy division, Western Gulf Region, Soil Conservation Service, Fort Worth, Tex.

Here's one man's testimony of its versatility. It is by H. C. Westberry of the Files Valley community, a cooperator with the Ellis-Prairie Soil Conservation District, who has used Hubam clover on his terraced and contoured fields for several years.

"Hubam clover," Westberry said, "has been my best cash crop for several years. The seed yields range from 450 to 600 pounds an acre.

"My cotton yields," he continued, "have been increased 40 percent, corn by 10 bushels an acre, and oats production is up considerably. And I see very little dead cotton in my fields since I started planting clover."

This Blackland is a narrow, irregular area of about 11,100,000 acres, which had built a reputation far and wide for its richness. The soils are generally clays variable in depth over parent material. Most has been farmed less than a hundred



Hubam clover is a soil-builder. Here it is being turned under. The added organic matter makes the soil easier to work, enables it to absorb more water, helps it to resist erosion, increases crop yields.

years, much of it continuously in cotton for long periods. Most of its organic matter is gone now: it absorbs water slowly and cracks when dry; it erodes easily. The fungus known as root rot has infested a large portion and causes much trouble. A successful legume was needed badly as part of the program to conserve soil and water.

That is where Hubam clover is doing things. Side-stepping root rot by growing early is the distinctive trait that makes it so valuable. The Texas Agricultural Experiment Station reports that at both the Temple and Denton substations crops which follow it are able to resist root rot.

Mrs. Endsley, on the John Scarborough farm near Paris in the North Texas Soil Conservation District, has discovered this too, as have many

others. She reports: "The 16 acres where we turned Hubam clover under as green manure produces like new land. No sign of root rot has shown since the clover was planted."

Hubam's record as stock feed is hard to beat. Henry J. Stermer near Rosebud, in the Central Texas Soil Conservation District, and the Warren brothers near Hewitt, in the McLennan County Soil Conservation District, tell about that.

Stermer pastured 6 cows on 5 acres of mixed Hubam clover and oats from early December until the middle of last March—better than 18 cow-months of grazing. And then last summer he cut nearly 7 tons of fine hay from the field.

"The cattle kept in good condition during the winter with very little supplemental feeding," Stermer noted. "That saved a lot in purchased feed."

The Warren brothers' angle is a little different. They didn't have to buy protein feed for their dairy herd last year so long as the Hubam clover hay lasted. That was an important saving.

The way Hubam clover mellows the Blackland soil causes comment. Otis Miles near Mosheim,



Hubam is a cash crop, too. A combine here threshes the seed out of the windrow. The yield was estimated at 550 pounds per acre.

in the Hamilton-Coryell Soil Conservation District, expresses his appreciation.

"Land will break well in August following Hubam clover, while land where clover was not grown usually is too dry and hard to plow," he said. Frank Blair of the same community veri-

fies this, and adds "I think it holds moisture better."

"Water in the terrace channel on the field where Hubam clover was grown was never as deep last year as in terrace channels on the other fields," is the evidence given by Rufe Henson on the Smyth ranch near Groesbeck, in the Limestone-Falls Soil Conservation District.

And to make it official, the Blackland Experiment Station at Temple was able to check up on Hubam's effect on run-off. Measurements taken during a storm last April showed that the run-off from Hubam clover land was a third less than from land planted to oats. Soil losses were less, too.

The hot, dry summer of 1945 gave Hubam clover another severe test around Waxahachie, and it made good. W. G. Ralph, work unit conservationist for the Soil Conservation Service, found that cotton following Hubam was affected little. But cotton on adjacent fields turned yellow, wilted, and shed a great deal of fruit.

The soil where Hubam clover had been grown was in much better physical condition than in nearby fields not so treated, Ralph reported. Root rot was almost absent from the Hubam fields, but widespread in the others.

Right now, Hubam clover is a glittering cash crop. The good seed yields are general, with 400 to 500 pounds per acre common rather than the exception. At 14 cents a pound—the current price—that is a return of \$56 to \$70 an acre.

Some of this comes from poor land, too. Witness the experience of W. T. Arnett of the Union community, in the Hamilton-Coryell Soil Conservation District. He had 5 acres of Hubam clover, half of them "as poor land as any on the place." The clover on the poor land yielded better than anything else he had planted there. Of course, the good land yielded better.

The effects of Hubam clover on other Blackland crops is almost beyond comprehension, as a result of the nitrogen and organic matter it adds to the soil. Just a couple more examples: Rufe Henson declares the cotton yield on his field where Hubam had been grown was double the yield anywhere else on the ranch. And Alfred Ballman near Riesel says his cotton yields have risen to 240 pounds from 135 pounds of lint per acre, with corn yields jumping to 34 bushels from the former yields of 22 bushels an acre.

Hubam clover's rise to the glamour spot in con-

servation crop rotations in the Texas Blackland seems sudden, but it came after a slow start. As early as 1933, Soil Conservation Service technicians and the SCS Blackland Experiment Station were advocating its use. A few acres here and there succeeded; they formed the nucleus that furnished seed when the rush started.

In 1939, soil conservation districts which now include nearly all of the Blackland, took the lead in promoting Hubam clover's use. It was needed to relieve the chronic ills of the tight soil, and put new life into it. Its use in late years has been limited only by the seed supply.

From only a few thousand pounds of seed a few years ago, the crop has grown until in 1945 it amounted to about 3,000,000 pounds in the Blackland area. In 1936, W. J. Hamm near Red Oak, in the present Ellis-Prairie Soil Conservation District, planted 6 acres of Hubam clover—the first in the area; in 1945, there were 20,000 acres planted in the district. That is the way it is all over the Blackland.

The Blackland Experiment Station reported as early as 1943 that "in the past it has been considered economically unsound to devote a crop year to the production of a soil-improving legume. Hubam clover, at the present time, can be considered a cash crop as well as a soil-improving legume. In addition to producing as much cotton in 1 year as continuous cotton produced in 2 years, the Hubam * * * produced an average of 352 pounds of seed per acre."

Thus, Hubam clover has won its favored spot on its merits. Together with terraces, contour farming, crop rotations and other practices, it rounds out the coordinated conservation plans on the Blackland. It appears destined to be the "added something" to lead the Blackland on the road back.

And it promises to add further to its conquests, also, for farmers in the Grand Prairie, West Cross Timbers, Rolling Plain and Rio Grande Plain sections of Texas are finding Hubam clover to their liking. It fits well into their cropping and grazing systems.

Individual farmers, district supervisors, business men are discovering the value of *Soil Conservation Magazine*, with the result that the number of subscriptions has doubled in less than a year. Price, \$1 per year. Orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A discount of 25 per cent is allowed on orders of 100 or more subscriptions going to a single address.

REVIEWS

SOIL EROSION IN NEW ZEALAND, A GEOGRAPHIC RECONNAISSANCE. By Kenneth B. Cumberland. Issued by the Soil Conservation and River's Control Council and printed by Whitcombe & Tombs, Ltd. 227 pages and inset maps, 60 plates and figures. Wellington. 1944.

This is an outstanding book that may well come to take its place as a classic in the field. Beautifully illustrated, well-furnished with tables, charts, colored maps, a comprehensive bibliography, and an excellent index, the work is certainly one of the best surveys that has been issued in any country.

The severity of erosion problem in all its details is very clearly and graphically set forth. "Not less than 28 million acres in the Dominion and possibly many more," says Mr. Cumberland, "are inflicted with the disease of culturally accelerated erosion to a degree which justifies national concern. This is more than two-fifths of the area of the Dominion, and more than two-thirds of the area in occupation."

Arable agriculture, as the report shows, plays but a small part in the farm economy of New Zealand. About 75 percent of the occupied area is in pasture or grassland, and 16 percent in forest or brush. Practically the whole country was forested originally, and the land surface is generally rugged, broken, and steeply sloping. To turn a great forest into grassland and keep it that way, on a sharply inclined and corrugated land surface is what the New Zealanders have tried to do. Fire and grazing have been used for the job, and since neither has been controlled to any great extent, the wholesale removal of vegetation has laid open the soils to the elements. Rainfall is heavy—almost three-quarters of the islands get more than 60 inches a year. And so erosion has taken a heavy toll.

To one accustomed to the kinds of erosion we have in the United States, many of the unusual or unique types present in New Zealand are startling to say the least. Sheet erosion, wind erosion, gully erosion—these are familiar enough to Americans. But wholesale slipping of mountain sides, soil flowing, mass movements, subcutaneous tunnelling, slumping, earth creep, mud flows, shingle slides, and explosive avalanches are something less well known to us, at least on a wholesale scale. These forms of erosion, uncommon in America except in local areas, cannot be described here, but one example of fluid earth flowage accompanied by an explosive avalanche is worth quoting. Picture the scene:

"At Parihauhan * * * a steep (48 percent) hillside rising 600 feet at uniform grade from a log-strewn raupo swamp * * * lubricated the slipping surface of the rock below the soil. Further intense warm front rains saturated the surface soil, making it a fluid mass * * *."

"At the stage when * * * large parts of the hillside were rendered unstable, sod, soil, and subsoil over half acre areas of the slope slid downhill. Tension cracks developed as the sod tore apart at the head of the slip. Lower down * * * a turf roll or toe was built confining a mass of liquid mud * * * the toe swelled until it burst and poured forth a heterogeneous welter of water, mud, and turf * * * down the slope. This mud avalanche * * * bent over young manuka in its path * * * built sod levees down its margins, and spread out a fan of yellow soil and broken turf over the easier country and * * * into the swamp. Sheep were caught, held, and sometimes buried * * *."

The plates portray the wholesale nature of this and other startling types of erosion characterized by large-scale slumping, slipping, and flowing. As the author says, "Many of the forms are rare outside New Zealand: A few appear to be almost unique and for some no counter measures have been worked out. New Zealand has its own special problems * * * for these, New Zealand solutions must be found." As he notes, the United States Soil Conservation Service has devoted the greater part of its research to erosion prevention "in the vast areas of tillage agriculture, and more especially, in the areas of disastrous row-crop cultivation." But terracing, contour plowing, strip cropping, crop rotations, cover cropping and similar techniques have but limited application in New Zealand. Research and demonstration of the effective techniques discovered are urgently required.

The wealth of information in the 227 pages of this book is impressive. Mr. Cumberland takes his time and builds his case with care. Region by region he discusses the land of New Zealand, its original vegetation, the history of land use, present uses of the land, the extent of erosion, the types of erosion, the geology, and so on. For 109 pages he considers these matters in a clear and scientific way, and then in a large table he provides a summary for each and all of the seven erosion regions into which he has divided the country. The book moves to completion through smaller sections on suggested regional policies, the general needs incident to a soil conservation program, and the wider implications of soil conservation. Four appendices of considerable length treat the relation between erosion and geology, climate, soils, natural and cultural vegetation. A fifth appendix contains a résumé of the New Zealand Soil Conservation

and River's Control Act of 1941. A glossary, selected bibliography, and index concludes the volume.

The maps in this work deserve special mention. Most impressive is a colored map folded in the back cover, and measuring 16 by 20 inches. The main figure shows the cultural vegetation and land utilization in 11 colors. Insets show primitive vegetation of New Zealand in 1840, rainfall, relief, locations, and forest types. This large map is reprinted from the *Geographical Review* (31:4 Pl. II, 1941). A black and white fold-in map facing page 212 shows the geology of the two islands, and other full-page maps show soils, frost frequency, arable lands, seasonable distribution of precipitation, annual rainfall, erosion regions, and the like. Together with 60 plates, admirably calculated to portray erosion conditions in New Zealand, the completeness of illustration is remarkably good.

It is too bad that the plates are not linked closely with text descriptions. The reader must therefore spend time trying to find the pictures that go with the phenomena he reads about. The glossary could also be improved for readers who are not New Zealanders if it carried explanations of the many Maori names for trees and other objects not always defined in the text. Laymen will occasionally find some of the material heavy going, but not so much so as to detract seriously from the readability. Figure 1a and 1b lack legends for large portions of the islands—but these are not serious faults.

As far as this reviewer can find, this excellent book is not easily purchased in the United States. Bookstores do not carry it and there is a certain amount of red tape associated with ordering it. This state of affairs is not peculiar to this book, but to many books published outside this country. Nevertheless, the soil conservationist who keeps up with what is going on in the world will do well to order a copy if his personal library is to contain those works that mean the most in the great soil conservation movement.

—William R. Van Dersal.

DETACHMENT AND TRANSPORTATION

(Continued from p. 179)

A soil that has a high clay content may have strong cohesion between particles. This cohesion causes the particles to resist separation and it may be so strong as to reduce rates of erosion. However, after the fine clay particles are once detached, they are easily transported by flowing water. They are so easily kept in suspension that it may take them several hours or even several days to settle out of standing water.

In contrast with a clay soil, a sandy soil which contains very little colloidal material will exhibit only small amounts of cohesion between the particles. Its particles, therefore, will be easily detached. However, sands are more difficult to transport than are clays. And so, erosion on a

sandy soil will be restricted not so much by the work required to detach the particles, but more by the difficulties of transporting these materials in the flowing water after they are once detached.

Such differences in soils will have a bearing on land use practices for controlling erosion. The erosion control practices most effective in preventing soil from becoming detached will not always be the most effective practices for curtailing soil transportation. Experimental evidence has shown that the principal source of energy which causes soil detachment, at least outside the gullies is raindrop impact, while the principal source of energy which causes soil transportation is surface flow. With these facts as a guide, one should be able to determine from examination of the soil and field conditions what measures will be most effective for controlling erosion; whether, for example, a mulch or vegetative cover on the one hand to check soil detachment by raindrop impact, or contouring and terracing, on the other hand, to impede soil transportation by surface flow.

DAVE DIGS IN

This is how a war veteran, partially disabled and unable to follow his pre-war occupation, made his own niche in peacetime production.

Dave McVickers returned recently to his home in Brown County, Kan. From the Soil Conservation Service he learned that to protect agricultural resources Kansas farmers would have to put 818,000 miles of terraces on their land. Dave figured he could do a lot of contracting.

Dave talked over his plans with the local banker. A loan enabled the purchase of necessary equipment. Dave also talked to farmers cooperating with the Brown County Soil Conservation District. Terracing jobs were lined up and advance payments obtained. With close to \$2,000 he bought a wheel tractor, a 2-bottom 18-inch plow, a tumblebug, and a pick-up truck.

Dave is now building the terraces even better than standard specifications for \$80 per mile plus \$3.50 per hour for making fills. At these prices he did \$1,200 worth of business in the first 60 days. He's already contracted for enough work to keep him busy at least a year. The equipment is being used 16 hours every day for building terraces when the land is in good shape, and on wetter days for custom plowing.

REFERENCE LIST



Compiled by William L. Robey, Printing & Distribution Unit

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SOIL CONSERVATION SERVICE

A Guide to Writing for Soil Conservation Service Writers. Prepared by the Education and Publications Section, Soil Conservation Service. Revised, November, 1945. Processed.

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¹ From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



Nature in repose. These snows will melt in a few weeks, replenishing streams and reservoirs, helping to make crops in the valley lands below.



MARCH 1946

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION

CLINTON P. ANDERSON

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CHIEF, SOIL CONSERVATION SERVICE

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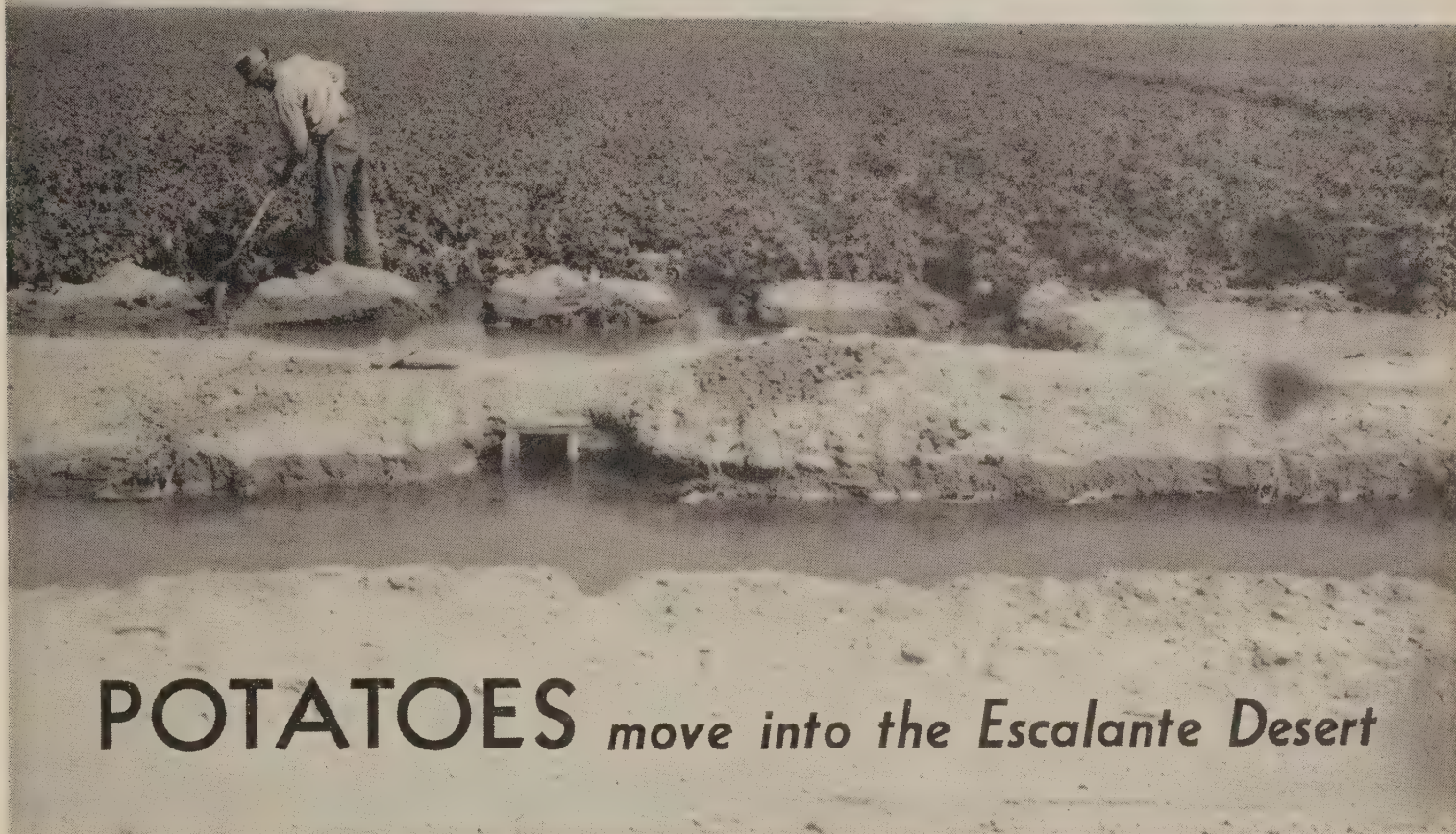
WELLINGTON BRINK, EDITOR

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*Front Cover: Terrace construction with disk plow
and tractor on L. H. Singletary farm in Georgia.
Photographer: Herrin Culver*

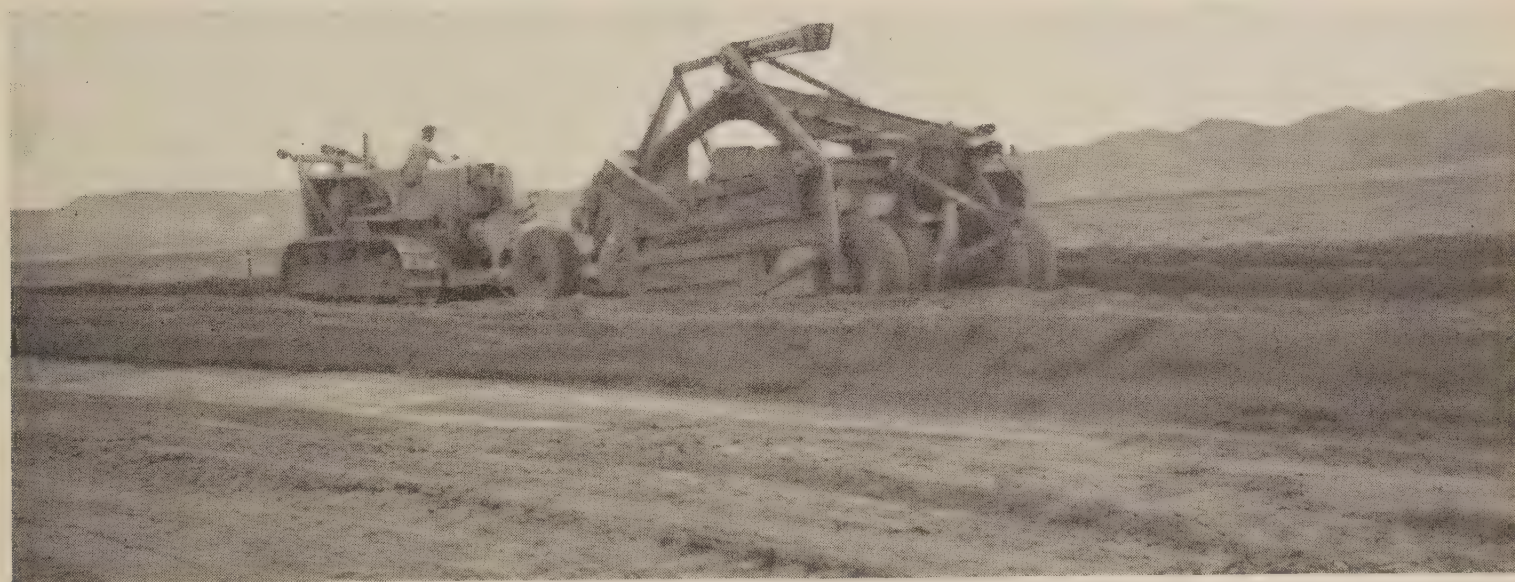
SOIL CONSERVATION is issued monthly by Soil Conservation Service of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of \$1.00 per year, domestic; \$1.50 per year foreign. Postage stamps will not be accepted in payment.



POTATOES *move into the Escalante Desert*

By Fred P. Howard

Potatoes are being irrigated here on land that was desert a year before.



After the sagebrush was cleared a heavy tractor and scraper were used to level the land. Cuts and fills were staked by Soil Conservation Service technicians.

WITH the exception of a few scattered cultivated areas, the Escalante Desert in Southern Utah has changed little since it was first seen by Father Escalante in 1776. Most of the small

NOTE.—The author is district conservationist for the Soil Conservation Service, Cedar City, Utah.

streams in the hills surrounding the area disappear before they reach the valley. The land is covered with sagebrush and has been used mainly for grazing.

The average cost of putting in pump wells and developing lands such as this for cultivation is



\$100 per acre. Land leveling and irrigation control formerly was limited to small farms, the largest project being a 40-acre plot. It is understandable, therefore, that the Enterprise Soil Conservation District was somewhat flabbergasted when H. G. Thorns and John Zuckerman of the Weyl-Zuckerman Co. walked into the district office and casually announced that they would like to clear and level 4,000 acres of land in the Escalante Desert.

The Weyl-Zuckerman Co. is concerned chiefly with raising certified seed potatoes on a large scale. The Escalante Desert was selected because of its climate, its isolation from other areas, and its excellence of soil. Well equipped and seasoned in experience, the company has been in the seed potato business since 1912. All it asked was cooperation from the soil conservation district and technical assistance from the staff of the Soil Conservation Service.

First step was to make a topographic survey. This information was needed in planning fields, well locations, and irrigation systems. Careful study of the base map showed the land could be divided into fields of 160 acres each. Since the only source of water is an underground reservoir, a system requiring 21 deep wells was laid out. Windbreaks, overnight storage ponds, a crop rotation and fertilization figured in preliminary plans. It was also necessary to establish service roads throughout the farm. When the various types of plans were completed, the fields were staked for land leveling by means of a grid system of 100-foot squares.

The Weyl-Zuckerman Co. designed and built equipment suited to the peculiar needs of land

Ditches were put in with road equipment. Proper lengths of runs and general field layout were considered in locating them.



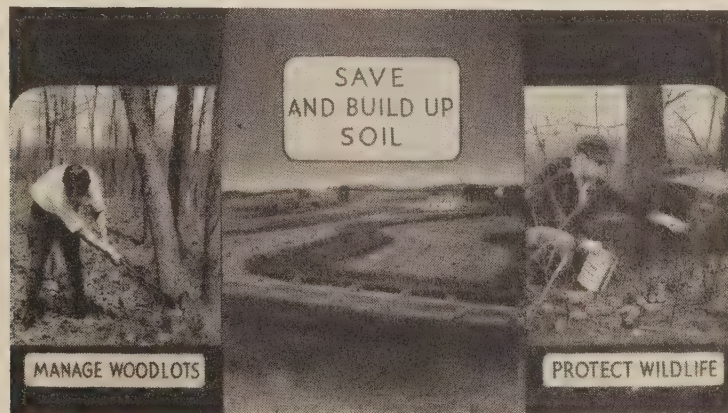
This machine distributes fertilizer, plants the potatoes, and makes irrigation furrows in one operation.

clearing on a large scale. Once cut, the sagebrush was raked into windrows and burned. Grade stakes were set calling for a 0.30 percent standard slope to the north and a 0.10 percent slope to the east for carrying off waste water. Dirt moving was started in April 1945, as soon as frost was out of the ground. Pick-up graders pulled by 80-horsepower tractors, were used. A 60-foot land plane followed the graders and all small irregularities were removed by making two diagonal trips and one square trip. The main irrigation ditches were made with a road patrol by angling the blade to a slope of $1\frac{1}{2}$:1. This resulted in an almost perfect ditch section. Plans are now being made to line all main ditches on the farm as a means of reducing seepage and erosion, since a large part of the soil is sandy loam. Temporary wooden headgate structures have been installed and a careful record is being kept of the amount of irrigation water applied to the fields.

(Continued on page 206)

YOUNG FARMERS

Vie With Each Other to Save Soil



THE National 4-H Soil Conservation Contest—1946—is in its third year. Open to bona fide 4-H Club members 14 to 20 years of age, with 3 or more years of supervised club work behind them, this contest has for its stated objectives:

1. To know about the value of soil.
2. To become interested in the farm family program of soil conservation for present and future production.
3. To learn through 4-H Club work how to conserve soil successfully.
4. To prevent soil wastage and deterioration on the farms.

The contest is sponsored by Federal, State, and county extension workers. Awards are donated by the Firestone Tire & Rubber Co.

In 1945 eight scholarships and trips to the National 4-H Club Congress were distributed to as many State winners; alternates also received trips to the Congress.

Recipients of \$200 college scholarships, together with their achievements, are listed as follows:

Philip W. Pierson, 17, Hockessin, Del., a 6-year member, mapped a model land-use plan for the gently rolling fields of his farm and energetically started to put it into effect. He strip-cropped a 20-acre field with corn and a soybean and Sudan grass mixture, after applying manure and fertilizer; he planted buffer strips of ryegrass in a second corn field as a temporary soil-holding measure, had soil from another tract tested for fertilizer needs, and began converting other fields to permanent pasture.

C. Jack Baird, 16, Arkansas City, Kans., noticed how much soil washed away at each rain,

and remembered that it takes 400 years to produce an inch of topsoil. To check it he influenced his father to put about one-fourth of the land in sweetclover. All cropland is now terraced and tillage and seeding operations done on the contour. The boy built a stock pond last year, and planted trees, clover, and lespedeza on badly washed spots.

Louis E. Kelly, 19, Whiteford, Md., a 3-year club member, realized something had to be done to save topsoil which was washing downhill at every rain. He started contouring every field, and it has increased the yield as high as 30 percent in some instances. He claims that conservation has done for the soil what no amount of lime and fertilizer could do by itself.

David S. Geisler, 16, Watervliet, Mich., a 5-year member, laid out a contour in a 500-tree peach orchard. He first surveyed the farm for drainage and seeded a waterway to prevent gully formation. He made tests of all fields for acidity, phosphate, and potash, and has a long-time plan to correct erosion and soil deficiency.

William C. Walker, 18, Coldwater, Miss., in club work 7 years, worked on soil conservation 2 years. During this time he cleared 125 acres of pasture and terraced 305 acres, then applied 120 tons of lime, 10 of phosphate and 10 of basic slag. He planted 55 acres of vetch and oats for intergrazing and 1½ acres of white Dutch clover. Last year he set out 10,000 pine seedlings. On other farms he constructed 25,660 feet of terraces for which he received a total of \$205.28. His livestock are now watered from a 3-acre pond.

Kenneth Fitzgerald, 20, Pauls Valley, Okla., is

a 6-year member. His family moved to a new farm in 1940 and found some fields so badly eroded that they were unfit for cultivation. In 1941 they set out 15 acres of Bermuda grass and overseeded it with Korean lespedeza. By fall of 1942 the pasture was excellent. Kenneth built more than a mile of new terraces. These, together with farming on the contour, have checked erosion in the upland fields. He also surveyed terrace lines on other farms, totaling 375 acres. He also surveyed sites on 19 farm ponds, and checked 15 dams for Government specification requirements. He and Raymond Johnson won the 1944 State agricultural engineering contest in 1944.

Tim Kaufman, 16, Delmont, S. Dak., in helping plan the 1945 crop, studied carefully the record

books and history of his farm. He then contoured 8 acres of corn and 25 acres of oats, and strip-cropped another 25-acre field. He helped haul 40 loads of manure and duckfooted all stubble except 16 acres of volunteer rye on a 50-acre pasture. The rye will be used as a green manure crop next spring. His efforts resulted in bumper small grain and corn crops this year.

Marvin A. Glover, Jr., 17, Pamplin, Va., is a 5-year member. He established two sod channels for carrying water from the field to prevent gullies, clipped weeds in the pasture to help control growth, laid out contour strips, planting alternate strips in corn and hay. He dug drainage ditches to improve grazing, and prepared and seeded lespedeza as a feed plot for wildlife.

Conserving Kentucky's Soil ♦ By James Stewart

ESSAY CONTEST STIRS STATE.—Some 4,636 Kentucky high school students know much more about soil conservation than they did a few months ago. Each of them submitted an essay in the contest sponsored last fall by the Courier-Journal, the Louisville Times and Radio Station WHAS of Louisville and the Kentucky Association of Soil Conservation District supervisors. The essay subject was "Conserving Kentucky's Soil."

James Stewart of the Sinking Fork High School and the Christian County Soil Conservation District won the State-wide first prize, a \$100 Victory bond. The essay written by this Gracey, Ky., youth begins on this page. Second place winner was Ruth Boyles, Tomkinsville High School, in the Monroe County Soil Conservation District. She received a \$50 bond. Third prize of a \$25 bond went to Avalon Skaggs, Hodgenville High School and LaRue County Soil Conservation District.

The Louisville newspapers and radio station gave \$1,500 in Victory bonds to soil conservation district and state winners. Supplemental prizes subscribed by merchants, bankers, district supervisors, county farm bureaus, civic clubs, schools, and others totaled \$1,850.50. This money, plus most of the bonds provided by the newspapers and radio station, went to contest winners in 56 soil-conservation districts and in seven counties not in districts.

The 1945 contest attracted much more interest than did the first one held in 1944 under the same sponsorship. At least 300 stories about the event were published by Kentucky newspapers. In 1944, there were 1,714 contestants who divided \$1,500 in war bonds and \$681 in local awards.—EDITOR.

IT is no wonder that Boone was favorably impressed with Kentucky. The rolling lands, enriched by accumulation of organic and mineral materials for centuries, supported virgin hardwood forests and abounded with game. Beneath the trees was a cover of smaller plants and litter which held back the rainfall and fed it into the numerous streams throughout the year. The

streams bore clear water, best suited for fish and land animals and desired by man. They afforded good transportation. The soil stayed in place and lost little from leaching. Truly, nature was in balance.

Then came the settlers, who cleared land and built homes. In selecting land for cultivation they gave little heed to the lay of the land or its

nature. It was all new and would produce a few good crops. They cut and burned the trees without regard to replacement. There was no time for soil conservation. Thoughtless practices continued until "the balance of nature" was disturbed.

The picture now changes. Cut-over or second-growth forests dot the State. Eroded, worn-out hillsides and those in course of depletion are too frequent. Streams carry muddy water, silt, flood and change their courses erratically. In spite of improved tillage, seed, fertilizer and other production factors crop yields are often less.

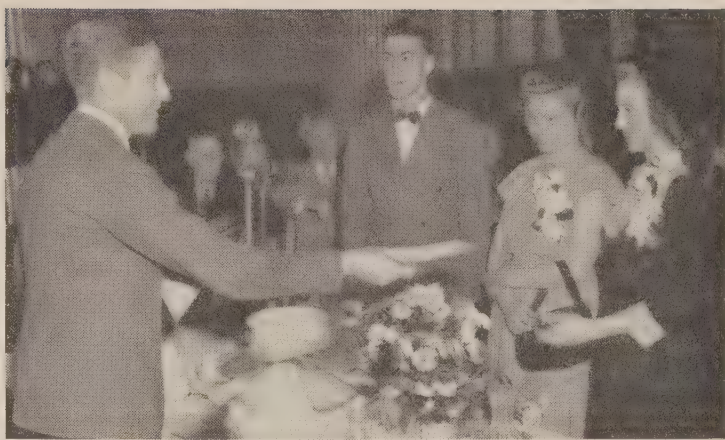
Saddest were the economic and social changes wrought. Farms and communities which once supported prosperous families, good trade centers, schools, churches, and local government of a high order for the period had often markedly deteriorated in these respects. In some sections the



Judging the contest. Seated, left to right: Ralph Wood, Department of Vocational Agriculture; Mrs. J. Kidwell Grannis, Kentucky Council of Conservation; A Threlkeld, president, Kentucky Association of Soil Conservation District Supervisors. Standing, left to right: H. A. Browning, commissioner of conservation, State soil conservation committee; J. E. Stanford, executive secretary, Kentucky Farm Bureau; H. K. Gayle, state conservationist, Soil Conservation Service; E. J. Kinney, College of Agriculture, University of Kentucky. Judges not in picture: J. F. Williams, State superintendent of public instruction; Mrs. Barry Bingham, representing the Courier-Journal, the Louisville Times and Radio Station WHAS.

assessment value of property for taxes had fallen to the point where roads, schools, and government could only be provided at the expense of more prosperous areas. With a lower standard of living often came lawlessness and less interest in education and social improvement.

These physical changes in the quality and substances of the soil were not without their effects upon the human body. Malnutrition of the inhabitants of certain soil-depleted areas has been observed for years but the medical records of se-



Barry Bingham, president of sponsoring newspapers and radio station, presents Victory bonds to winners: First James Stewart, Gracey, Ky.; second, Ruth Boyles, Tompkinsville, Ky.; third, Avalon Skaggs, Hodgenville, Ky.

lectees examined for military service in World War II definitely show several times the rate of rejection for areas of leached and eroded land as compared with areas of more fertile, better-cared-for soil. The quality of the food nutrients in plants grown on poor soils is not equal to that of crops produced on fertile soils well supplied with plant food elements.

From the foregoing discussion it is evident that the maintenance of fertile, productive soils, protected from erosion and leaching, is essential to the health, economic well-being and social progress of Kentucky's people. Our land does not provide the good homes, high standard of living and opportunity for relaxation and self-improvement of which it is capable. Our State experiment station and Soil Conservation Service have demonstrated, beyond any doubt, certain practicable measures which can be employed by most any land owner to increase or maintain the fertility of his soil and to preserve it from most losses. The costs of these practices are in keeping with the immediate benefits or increases in yields.

The first problem of the farmer in setting up a sound soil-conservation program for his farm is to determine in what use to put each area of land. Soils are derived from different materials and vary in many characteristics which affect their productiveness and suitability for different crops. The slope of the land and the erosion it has undergone also help determine its capacity for different uses or crops. The farmer often knows the capabilities of his land from experience and observation but unless he has made a special study of soil science, agronomy, and conservation he is often in no better position to appraise and weigh all the factors determining land use than he is to diagnose and treat

a sick cow for which he would immediately call a veterinarian.

This is where the soil-conservation district comes in. It is an organization into which farmers enter voluntarily and which provides the services of trained technicians from the Soil Conservation Service, experienced in solving the soil-conservation problems with which the farmers are confronted. In fact the technician points out many of the problems as well as aiding in their solution. After the farm has been surveyed for its land capabilities and a suitable use decided on for each area, the problem arises of the selection of crops, the balancing of their acreage with the land's suitability, with the livestock to be kept and with the farmer's resources as to land, labor, and capital. Then, there is the matter of special conservation practices needed for each area. In addition to liming, fertilizing, and drainage it is often necessary to employ terraces, strip-cropping, contour tillage, special seeding of grass and legume mixtures, and sodding for rotation cropland, meadows and pastures. These problems require the best thinking of farmer and technician.

Also, the district may provide special equip-

ment, such as machinery for the construction of terraces, outlets and ponds, at nominal cost. Lime, fertilizer, seed, trees, or other plants and conservation materials may be purchased cooperatively by farmers of a district. It is a means of enabling farmers to unite in solving drainage, erosion, or other soil problems affecting more than one farm. It provides for mass education and direction of farmers in soil conservation and has technicians of many kinds at hand to help the farmer with his problems at any time.

Upon the soil depends our strength as a commonwealth and our contribution to the Nation's strength and progress. Upon it rests the responsibility of bringing forth perpetually new generations of Kentuckians who can carry on the fine traditions of leadership, achievement in science and arts, and of gallant character which have been handed down to us. With the united efforts of our farmers and other citizens directed in a systematic approach to the problems of conserving Kentucky's soil, under the guidance of democratic organizations such as the soil-conservation district, I feel confident that we can achieve these goals.



Leaders on the Land

By A. E. McClymonds

IN 3 States, five farmers receive Skelly awards in 6 months. In every one of these awards, conservation farming takes the lead.

This system of recognizing farmers for superior agricultural achievement was created in January 1943 by W. G. Skelly, president of a large oil company. Congressional recognition of his efforts to establish national honors for outstanding farmers was made before Congress by Congressman Ross Rizley, of Oklahoma.

Each Saturday morning as Lloyd Burlingham, outstanding agricultural authority and chairman of the committee of awards, announces over the NBC network the weekly winner, farmers and

ranchers hear the part soil conservation has played in better and stabilized production.

One of the September awards was received by Joe J. Calder of Nuckolls County, Nebr. After pointing out that the Cornhusker State has 58 soil-conservation districts (as of November 1, there were 61 districts), the committee of farm leaders in charge of the awards reported that Calder is an outstanding leader "among the State's 97,900 farmers. He and his family own and operate a 600-acre farm and have worked out a complete system of conserving its fertility."

The farm is near Hardy and just a few miles north of the Kansas-Nebraska border. Calder, a cooperator with the Nuckolls County Soil Conservation District, started soil-conserving practices 10 years ago. As a result, 130 acres are terraced. In the last two years 46 acres have been leveled and seeded to grama and buffalo grass, and 30 acres have been seeded to brome grass.

"Having gotten the soil under control against serious erosion, a good rotation is carefully followed," the committee reported. "Both sweet clover and brome grass are valued in holding soil, and both are plowed under for humus."

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Nebr.

Calder keeps a milking herd of 14 cows, and a laying flock of 400 chickens. From 40 to 50 steers are fed out, and about 250 hogs are fattened to around 270 pounds each year. He is also active in community life, being a member of the Hardy Community Club, a director of the Hardy State Bank, secretary of the Farmers Union Elevator Co., president of the Union Church board, and secretary of the church's Sunday School.

Calder received the award, consisting of a \$100 war bond, scroll, pennant, and gold lapel button at a breakfast given in his honor.

Another Nebraska winner was A. H. Sibbernsen, Washington County farmer, who won recognition for an amazing food production record of 300 tons of meat from a once run-down farm. Sibbernsen, a cooperator with the Papio Soil Conservation District who operates 800 acres, was featured in the September 1945 issue of this magazine. Grain produced on his farm was used to produce 300,000 pounds of beef, 220,000 pounds of lamb, 96,000 pounds of pork, and 12,000 pounds of milk last year. All 800 acres are operated under a soil conservation plan that includes terracing, grassed waterways, contouring, retirement of the steeper slopes to grass and legumes, a balanced soil-building crop rotation and stubble mulch farming.

When told that his award included a \$100 war bond, Sibbernsen asked that four \$25 bonds be issued instead to four hired men. These men, Sibbernsen said, deserve credit for the farm's success.

Claude C. Cunningham, Eldorado, Kans., was another recipient of the Skelly award. A member of the State board of agriculture, a former legislator, president of the Kansas State Crop Improvement Association, expert grain judge and chairman of the board of supervisors of the Butler County Soil Conservation District, Cunningham operates a 128-acre farm near Eldorado.

Earlier this year, he said that he expected to harvest 800 bushels of hybrid seed corn, 450 of Atlas sorgo seed, 1,500 of blackhull kafir, 3,000 of brome grass, and 6,000 of popcorn. Additional expected production included 36,000 pounds of milk, 4,000 of spring lambs, 1,250 of veal, and 75 purebred hogs.

Louis and Oliver Aaen of Yankton County, S. D., who also received the award, operate 560 acres of land 5 miles northwest of Volin.

This year, the Aaen brothers, cooperators with the Yankton County Soil Conservation District,

grew 160 acres of oats which averaged between 45 to 50 bushels per acre, and had 240 acres in hybrid corn, 100 of which were terraced against moisture loss and soil erosion. Last year they produced 10,000 bushels of corn, 150,000 pounds of beef, 900 pounds of butterfat, and 1,000 dozen eggs.

They are believers in modern weed control practices. In cooperation with the soil-conservation program they have 10 acres planted in a Ree grass (intermediate wheatgrass) seed plot which is producing a heavy stand of drouth-resistant grass this year. Also leaders in livestock feeding, the brothers annually feed about 150 head of white faced Hereford cattle. Both brothers are members of the Volin Community Club of which Louis is treasurer.

In the months of April through September, there have been 26 Skelly awards presented. The awards have been mostly in the Mid-West, covering a 24-State area. Average State participation would be about one award a year, yet Nebraska, Kansas, and South Dakota have rung for five of them in 6 months. It speaks well for the conservation job being done by cooperators in those States.

GRAND CHAMPION

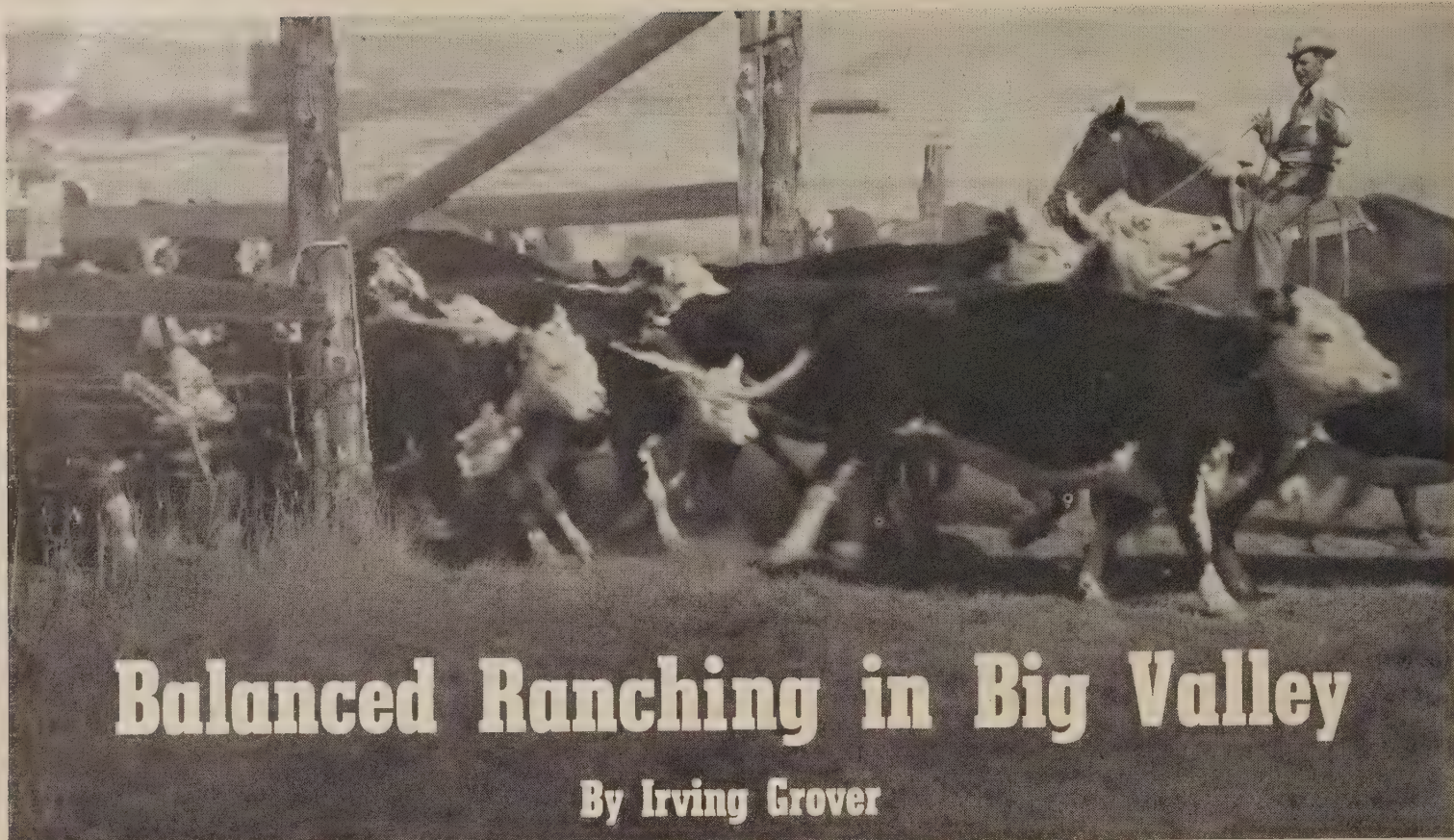
The grand champion steer at the Chicago International Livestock show last fall was fed on a farm in Wright County, Iowa, owned by Stanton Christie, Soil Conservation Service work unit conservationist at Mount Pleasant, Iowa. The farm is operated by Joe Duea who has a stock-share lease with Mr. Christie.

The prize steer, a purebred Shorthorn, weighed 1,110 pounds and was sold for \$10 a pound to a Chicago restaurant. The sale and prizes brought a total of \$12,375.

Carl A. Herkel, of Mason City, owner of the steer, contracted with Duea and Christie to do the feeding. The ration included brome alfalfa hay, beet pulp, and the usual grain and concentrates. The Christie place is farmed the conservation way.

WHEN IN NEED OF IDEAS

Essay contestants and others find useful materials in this magazine. *Soil Conservation* subscriptions may be obtained at \$1 per year from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.



Balanced Ranching in Big Valley

By Irving Grover

Moving cattle from one field to another is part of a systematic plan for rotating grazing use. Ed Albaugh says that this, together with moderate grazing, is the key to maintaining his meadow and range in good condition and full production.

"Will some of that sweetclover seed be for sale, Ed?" asked one of J. E. Albaugh's neighbors just before driving off with a bunch of steers he had weighed on Albaugh's stock scales. Albaugh was in the process of harvesting the sweetclover seed that bright morning in September 1945 when his friend drove the cattle in for weighing.

SCALES and sweetclover symbolize Albaugh's position as a progressive and successful rancher in Big Valley. The scales eliminate guesswork as to whether his cattle or sheep are gaining weight as they should. The scales tell him when adjustments are needed in the grazing and feeding program. The sweetclover provides grazing to supplement range and pastures, and makes some of these adjustments possible. The result is that animals go to market in top condition, and that breeding stock is always thrifty. His breeding herds consistently produce 90-percent calf crops and excellent lamb crops.

Albaugh knows that what counts isn't the *number* of cows and sheep on the place; it's the pounds

of quality lamb and beef he sells every year. This means that livestock numbers have to be kept in balance with feed supplies. With that in mind he has reduced his original breeding herd from about 300 cattle to 200, including replacement heifers. When Albaugh kept 300 cattle he was selling yearling steers. Now he still further reduces the strain on the ranch-grown feed supply by selling calves in the fall so that he doesn't have to carry them through the winter.

Albaugh is adopting conservation measures all over his ranch to increase feed supplies. When the full effect of these improvements is realized readjustments will be made, but always so that there will be a balance between feed supplies and feed requirements.

The Albaughs bought their ranch in the spring of 1937. The ranch is near the town of Adin in what is known as Big Valley, in northwestern Lassen County, Calif. Somewhat isolated, Big Valley lies at an elevation of about 4,200 feet in the southern end of the Cascade Range. Rainfall averages 16 inches. Creeks which drain the valley flow into Pit River, a major source of the water in the Shasta Dam reservoir.

NOTE.—The author is work unit leader, Soil Conservation Service, Corning, Calif.



Farmstead behind, sheep in front. Rotation grazing helps meadow produce high quality forage.



Grazing management brings marked recovery of bitterbrush in one of Albaugh's fields (right of fence).



Albaugh sowed wheat in 12-inch drill rows with sweetclover in between.



Now healing is this gully which was eating into Albaugh's meadow eight years ago.



Three good reasons to conserve soil: Albaugh's children—Dale, Jean, and Ronnie.



Albaugh carries shovel to adjust flow of water when shifting cattle between fields.

The shape his ranch was in when Albaugh took over was typical of many other ranches in Big Valley, and of numerous similar areas in northern California.

In pioneer days about half the land that is now Albaugh's ranch was headquarters for an outfit reported to have run about 600 head of cattle and about a hundred head of horses. The other half was devoted to grain farming, the original owners reportedly having been the first to bring the modern combine to Big Valley early in the 1900's. Operators ran their herds on public lands and used the home ranch for wintering, calving and marketing. Under their system of stocking, the range adjacent to headquarters became less and less productive. With the life of the soil being sapped steadily, erosion began to get in its licks. Topsoil washed away in the winter and blew away in the summer. What had been range that produced several months of good grazing from perennial plants either had been plowed up or had become sagebrush and annuals, furnishing mediocre grazing for only 2 or 3 months.

The part of the meadow which had been used for grazing was also on the skids. Overuse had knocked out the good forage and the soil-binding types of plant growth. This allowed gullying to start in the lower end of the meadow. As a result, the water table was lowered, decreasing the amount and quality of feed produced.

Willow Creek, a mountain stream, cuts through the Albaugh ranch. It provides irrigation water for the 250-acre mountain meadow, the backbone of the ranch's supplemental feed program. It was concerning the improvement of this meadow that Albaugh, in 1942, went to T. S. Brown, Lassen County farm advisor, and asked for a cooperative demonstration plan for soil conservation. The soils on the ranch were mapped and a conservation plan was drawn up for the entire ranch in the summer of that year through the combined efforts of Albaugh, Brown, and Soil Conservation Service technicians.

The plans include leveling and reseeding the meadow when earth-moving equipment becomes available and finances permit. Previous to the drawing up of the plan Albaugh had made big strides toward improving the meadow land. First he stopped the headward cutting of a large gully. About 100 acres of the meadow had little clover growing in it. This area he reseeded to alsike clover, broadcasting the seed on the land in the

early fall. The result has been to improve the yield and quality of forage.

Along with this successful attempt to improve the quality of the hay and pasture produced on the meadow went several other good practices. These included constant vigilance and care in irrigation, changing the water frequently to conserve and make the most of a limited supply, and providing drainage of wet areas so that the desirable meadow grasses, such as meadow fescue, smooth brome, bluegrass, timothy, red and alsike clovers, could grow instead of sedges. Still greater production will be realized when the meadow is leveled and reseeded. The 130 acres of meadow used for hay production produces about 200 tons of high-quality meadow hay which keeps the herd of 200 Hereford cows and replacement heifers and about 60 ewes in good condition through the zero weather of winter.

Albaugh has also been trying various ways to improve his range, of which he has some 1,800 acres. Of prime importance was the fencing program undertaken shortly after the ranch was purchased. At that time, the ranch consisted of three large units which were difficult to graze properly. To remedy this situation several miles of cross-fences were built to make rotation grazing possible. Rotation, Albaugh says, forces the livestock to graze in such a way that desirable grasses are maintained vigorous and productive, and undesirable plants are held in check.

The soil on part of this range is a gravelly loam which has a hardpan within 8 to 10 inches of the surface. Reseeding on this soil is virtually impossible. Albaugh believes that good grazing management of the native forage plants is the only way to bring about improvement. To this end deferred grazing also has been practiced. The range was so badly run down, however, that progress is painfully slow. Albaugh isn't sure that the deferred grazing is a paying proposition, although in one field which has been deferred more than any other marked signs of increase in native perennial grasses such as smooth wild-rye and Sandberg blue grass can be noted among the sagebrush, and a protective litter of old grass is beginning to accumulate.

The soil of another part of the range is sandy loam. This soil is deeper and supports a vegetation of mixed bitterbrush and sagebrush. Bitterbrush is the choice browse plant on the semi-arid ranges of Lassen County but is easily killed or

stunted by improper browsing. Here the results of good management practices are most apparent. Young bitterbrush plants are everywhere to be seen, and the older plants are tall and thrifty. Proof that this condition is the result of good management is brought out by a comparison with other bitterbrush ranges in the valley. Where grazed improperly, bitterbrush is stunted and dying, no young plants can be found, and sagebrush and cheatgrass are taking over.

Water development has played an important part in the range improvement program by providing uniform grazing. When Albaugh first took over the ranch he put down a well, erected a windmill and built a concrete watering trough 8 feet wide, 2 feet deep, and 32 feet long. Last year he constructed an earth-fill dam which Soil Conservation Service workers surveyed and staked for him. This dam backed up 40 acre-feet of water when the reservoir filled last winter.

He also built a smaller dam in one of his smaller grazing units which had been without stock water except during the early spring, when because of soft ground and new growth, livestock would damage the forage plants by trampling and too early use. Another apparent benefit of these dams is the increased growth of desirable range grasses resulting from subirrigation of the stored water. The willows and other aquatic plant life which are starting to grow around the edges of these reservoirs will afford cover for wildlife.

Nearly half of the range has a deep, well-drained sandy soil. The former owners grew grain on this land and Albaugh, when he took over the ranch, continued to cultivate it, growing rye for the pasturage it afforded. He soon found that this did not pay, and, too, he was losing topsoil every year through wind and water erosion. Five years ago he started tentatively the seeding of alfalfa, sweetclover, crested wheatgrass, and Michels grass on about 50 acres. Now it is said that his 5-year-old stand of crested wheatgrass is as good as any in the West.

Last spring Albaugh bought enough seed of Ladak alfalfa, sweetclover, and crested wheatgrass to sow 100 acres. Careful seedbed preparation and drill seeding resulted in a good stand in spite of adverse weather. He is sold on the value of good seedbed preparation. He has tried both broadcasting and drilling on dry land without seedbed preparation and has found that it

doesn't work. This contrasts with his experience of seeding on meadows where no seedbed preparation was found necessary if the seeded area is properly irrigated and drained while the seedlings are getting started.

This fall enough Ladak alfalfa, sweetclover, and crested wheatgrass seed were harvested on the original trial areas to furnish seed for re-seeding another large acreage next year.

In addition to providing feed for livestock the sweetclover is a soil builder for the grain land. The extent to which growing of sweetclover will increase grain yields has not yet been fully determined. Two years ago Albaugh sowed sweetclover with wheat in 6-inch drill rows. The wheat harvested last year paid all expenses of establishment so that the income realized from the sweetclover seed this year is all profit. Last spring on another area, he tried sowing wheat in 12-inch drill rows with sweetclover between. This, he believes, is a much better system. In spite of the wider spacing of the wheat, the total yield per acre was very little less than usual because the heads were longer and better filled out. Albaugh feels that the value of grazing he obtained from the sweetclover after the wheat was harvested will more than offset the slight decrease in yield that was experienced this year. There is a distinct possibility that the yield of the next crop of wheat will be increased because of the nitrogen put in the soil by the sweetclover.

When asked why he had adopted so many soil-conserving practices on his ranch, Albaugh's answer was typical of most conservation-minded farmers and ranchers, namely, that soil conservation pays. It pays not only for its own cost, but it increases net income above that which can be realized when the needs of the soil are overlooked.

Albaugh, however, has still another reason for his soil conservation program. He has three fine children, two boys and a girl. He wants the ranch to be more productive when he hands it over to them than it was when he bought it. All three, young as they are, take an active part in some phase of the ranch work and they like it. Dale, the oldest, though only 10, drives the tractor pulling the combine or other equipment and handles cattle like an old hand. The others help with chores such as milking and feeding the chickens and pigs. He has good reason to keep the ranch productive so that at least one of his

children will want to take over when he retires from active ranch life.

As important as anything else to the success of the ranch is the good home management, supervised by Mrs. Albaugh and ably assisted by her mother. The two of them put out excellent meals for their family and for such hired men and visitors as may be on the ranch at different times of the year. These meals owe a lot of their success to the fresh vegetables the women folk grow in the garden back of the house.

In the 8 years on his Big Valley ranch Albaugh has done other things besides those listed here—things which make possible a general soil-conservation program on his ranch. Diversification is one of the most important. Although cattle are the principal source of ranch income, there are also sheep, chickens, hogs and milk cows. Except for protein concentrates which he buys and mixes on the ranch with his home-grown ground grain, he buys no supplemental feed.

Neighboring ranchers are much interested in Albaugh's sweetclover and range reseeding program. The value of the conservation practices and the wisdom of his idea of carefully balancing the number of livestock with the amount of feed that a rancher can produce or afford to buy becomes more apparent each succeeding year.

POTATOES

move into the Escalante Desert

(Continued from page 196)

At each well location overnight storage ponds have been built to store approximately 5 acre-feet of water. Such a system provides for the efficient use of irrigation water by making available a variable head of water to meet conditions of the soil and different water requirements of the various crops. It also reduces wasteful night irrigation by allowing the water to be applied during the daylight hours. Soil tests at the overnight storage sites indicated that considerable seepage would occur unless the ponds were treated with a sealing material. Technicians advised covering the bottom of the pond with a clay blanket 1 to 3 inches thick, together with an application of 5 pounds of salt for every 10 square feet. An excellent seal was obtained by spreading the clay and salt over the area, discing it into the top 6 inches

and compacting it with a sheep's foot roller.

Heavy seasonal winds cause considerable erosion during the greater part of the year. Last spring four and a half miles of 4-row protective windbreaks—squawberry, Russian olive, green ash and conifer—were planted on the south and west sides of the farm. The rows were spaced 6 feet between the squawberry and the Russian olive, 8 feet between the Russian olive and green ash, and 10 feet between the green ash and conifer. The windbreak will be extended each year until the entire farm is protected.

Crops will be rotated thus: potatoes 1 year (first crop on the newly cleared land), small grains 1 year (nurse crop for alfalfa), alfalfa 3 years. Beginning the sixth year this rotation will repeat, starting with potatoes. When the entire farm is under cultivation, there will be approximately 800 acres of potatoes, 800 acres of small grains, and 2,400 acres of alfalfa each year. It is estimated that the yields will amount to approximately 350,000 bushels of potatoes, 70,000 bushels of small grains, and 10,000 tons of alfalfa. The well-rounded farm plan contemplates that the grain and alfalfa will be fed to livestock. Corrals, feeding troughs, and other improvements are to be built as quickly as possible. Chemical analysis of the soil shows an ample supply of phosphate and potash but a deficiency of nitrogen. This deficiency will be corrected by adding 500 pounds per acre of commercial nitrogen with each planting of potatoes. Barnyard manure will be added to the alfalfa in the third year, and the last cutting of alfalfa will be plowed under as a green manure crop.

Eight hundred acres of land were leveled and placed under cultivation in 1945. Eight hundred additional acres will be leveled each year until the project is completed. Other plans include permanent concrete structures and gravel-surfaced roads.

Soil conservation practices thus are making a substantial contribution to the growing of superior certified seed potatoes on so-called desert land. It is likely that the Weyl-Zuckerman farm will serve as a model to all those who are interested in establishing themselves in this area.

The managed hedge has not only a land-use value but also an important influence on wildlife. It makes a good home for birds and small game.

How Taos Farmers Water Their Fields

By Elizabeth Poe



This heading on the "Acequia Madre de los Cordovas," 15 miles from Taos, N. M., required 400 man-days to construct. But it ended flooding on the ditch and now gives farmers two crops of alfalfa instead of one.

IN the Penasco Valley, 25 miles south of the village of Taos, N. Mex., there is less than one acre of irrigated land per person. The average total cash income per family is less than \$600 a year. Part of the land has been in cultivation since ancestors of the present inhabitants first broke the soil late in the sixteenth century. What these people have done to keep the land in cultivation since then makes them figure in the history of the oldest cooperatives in the United States.

The Taos Indian pueblo was discovered in 1540 by Hernando De Alvarado, who came into New Mexico with Coronado. Alvarado's followers were so attracted by the valley of Taos that some of them returned within a few years and settled in the mountain valleys and mesas. Today their descendants, who live in the same mountain villages in central and northern New Mexico, are raising what they need to maintain an existence. They use both obsolete and modern farming



Forty-nine landowners benefit from this new metal flume on the "Acequia de Peñasco." The log flume at upper left leaked water at both ends. Like 14 other irrigation structures built in this area since 1943, it was designed by Soil Conservation Service technicians and built by Spanish-American farmers.

methods, both modern and primitive irrigation structures. They employ community effort to maintain the supply of water that comes to their fields from the many streams of the valleys through *acequias*, or ditches.

The Spanish explorers who came to New Mexico 400 years ago brought with them a knowledge of irrigation acquired from the Moors. They combined this knowledge with the practices al-

NOTE.—The author is head of the current information section, Soil Conservation Service, Albuquerque, N. Mex.

ready in existence among Indian tribes, and the result was the community *acequias*—oldest cooperatives in the United States. These *acequias* were for the benefit of all townspeople—each man contributing to the upkeep of the ditch according to the amount of land he had to be irrigated. This system exists largely unchanged today, since the custom became New Mexico territorial law in 1880. The law provided for the use of water and the contribution of labor, to be directed by three commissioners elected by water users, and to be administered by a *mayordomo de la acequia*.

Lacking surveying equipment, the farmers laid out their ditches by allowing the water to trickle ahead of them, finding the flattest grade. The ditches had to be carried across *arroyos* (intermittent streams) and washed out gullies, and this method was also simple. The Taos farmers cut the tallest trees from their forests, hollowed them out by hand, and placed them across the *arroyos* to serve as flumes. Today these flumes, called *canoas*, or sometimes *canogas*, are used all over the forested areas of New Mexico, though in many cases water is lost from the ditch at both ends.

Today the tall trees are gone. As each *canoa* collapses, banks erode further and the problem of maintaining the water supply becomes urgent. Summer flash floods make the *acequias* more and more difficult to keep up every year, and mending the ditches after the floods requires days of hard labor.

One of these ditches is the 6-mile *Acequia Madre de Chamisal y Ojito*—"The mother ditch of the place where the sagebrush grows and the little spring." The *Acequia Madre* was built by hand 150 years ago by the members of 12 families who needed a better water supply for their fields. With constant care, this ditch today irrigates 1,000 acres and serves 120 families.

Manuel Rodriguez, *mayordomo* of a branch of this ditch, says the first line built from the *Acequia Madre* was constructed by an old lady who wanted to water her cows. This line, four miles long, now serves as the main ditch for the Ojito valley. It provides water for 30 families. Each farmer who takes water from this ditch spends 15 days a year working on it. He spends 13 days out of each year irrigating his farm. Don Rodriguez figures that about \$6,000 worth of labor is put on the Chamisal-Ojito ditch system every year to keep it functioning. Even then,

the 120 farmers who benefit from this ditch have no water during the winter.

To solve the problems of the *acequias*—the collapsing *canoas*, and the eroding streambanks—the men of the villages decided to make agreements with Federal and local agencies in a position to offer assistance. The agreements, with the Soil Conservation Service, the Extension Service, and other agencies usually required the villagers to provide labor and materials to improve a structure, while the Federal agents furnished the design and technical advice. Since 1943, the Soil Conservation Service has designed 15 new irrigation structures for the people of Taos County. Though the people contributed 1,200 man-days of labor and 117 team-days to build these structures, the control effected over the streams means fewer hours spent during freezing spring days in an attempt to repair flood damage.

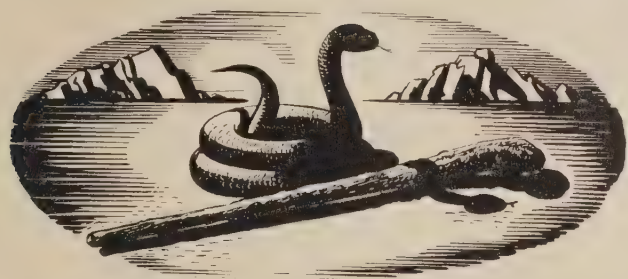
One of the new structures is on the *Acequia Madre de Chamisal y Ojito*, which once broke out annually and required 190 man-days of labor every spring for repair. A new log and rock heading on this ditch now controls the water that flows into it from the Rio Santa Barbara, and the danger of a washed out ditch is ended. Since most of the able-bodied young men had departed from Taos County for the war and defense work, old men and boys under age 18 did most of the work—much of it while standing in icy mountain water.

(Continued on page 213)



There's one irrigated acre per person here in the Pañasco Valley, 25 miles south of Taos. Average family income is \$600. Farmers use the valley for irrigated crops, graze their livestock on surrounding submarginal land.

STAFF or SERPENT?



By the Reverend Milton Heitzman

THE LORD had gotten Moses into a situation where he became cognizant of a need in his homeland and of a force that was greater than himself. Moses was told to go. "But suppose they will not believe me," answered Moses, "nor heed my plea, but say, 'The Lord did not appear to you?'"

The Lord said to him, "What have you in your hand?"

"A staff," he said.

"Throw it on the ground," said the Lord.

He threw it on the ground, and it became a snake.

Moses ran away from it, but the Lord said to him, "Stretch out your hand and lay hold of its tail." Stretching out his hand, Moses seized the snake, and it became a staff in his hand—"In order that they may be convinced that the Lord, the God of their fathers, did appear to you, the God of Abraham, Isaac, and Jacob."

God gave Moses that chance to go out and lead his people. But the interesting thing is the conversation.

All of us at some time or another have been given the challenge from our Creator, "What is in your hand?" And many of us have answered, "A staff." We have thought the land we hold in trust would always be near at hand, and the staffs which we held in our hand would always be the same. But we have cast them on the ground and allowed them to writhe in uncontrollable, terror-raising coils from which we flee. The staffs which we once held have become serpents.

The three serpents of which I speak are The River, The Rail, and The Row.

Released from our grasp, the Mississippi River has become a tremendous, writhing serpent carry-

ing away homes, livestock, land, and loved ones—that river about which they say "it is too thick to drink and too thin to plow." It is too thick with the land that we once held in our hand. It is slimy with the rich silt of the Middle West. That which was once a staff, has been cast on the ground and has become a serpent and thousands of men, seeing it, turn and flee. But we must stop, grab it by the tail and cause it to become a staff again.

The second serpent I would like to mention is the steel rail. Its shiny, winding beauty is alluring to the greedy. It beckons him to ship off his corn and cattle—his good plant food. The serpent—the steel rail—carries the plant food to the city and dumps it uselessly and poisonously into the rivers to be carried to the sea. That serpent needs to be grabbed by the tail and made into a staff that will be useful.

Conservationists are really doing something about the third serpent—the straight row. They have grabbed him by the tail and have caused him to curl around the hills in graceful lines called contours. But as I drive through the country I see that there are many other of those serpents laid out in straight patterns to resemble staffs but in reality to be numbered among the most evil of serpents. God and Man say to all of us, "What have you in your hand?"

When we carelessly cast them aside, the staffs become serpents but when we properly use the Row, the Rail, and the River, they become staffs once more. It is not too late to grab the serpent.

Many of us are most interested in one phase of soil conservation. It is the reason I—a minister—feel I have a place as important in soil conservation as that of farmer, soil conservationist, or student. I am primarily concerned with *what soil conservation does for the people*. I believe soil conservation is the one thing that will give rural people the new heart they need for living in this troubled world. I believe Soil Conservation will give them what Edwin Markham has said we all need:

*Three things must man possess
If his soul would live and know life's perfect good—
Three things would the all-supplying
Father give—
Bread, Beauty, and Brotherhood.*

As I see it, three types or groups of people develop when they begin associating with that dy-

NOTE.—The author is a minister in Melvin, Ill.

namic which we so carelessly term "soil." These groups are known as the Pioneer, the Conqueror, and the Serf. They are not definite groups or even particular types that are set apart immediately upon their birth and destined to remain that way. Rather, they are persons who are marked not by birth or wealth but by *attitude*.

THE PIONEER: Here is the hardy one. The pioneer in Europe was the man who could follow the Roman and the barbarian and the Norman conquerors. He could go into all of the ruin and pillage, and with deft optimism, set things aright. He could start little villages and begin to farm the land, ever looking forward to a better day for his son or daughter. He was resigned only to the fact that the hardships of today would lead to the ease and rest of the morrow. Bread, beauty, and brotherhood were his.

God spoke to him and said, "What is in your hand?" The pioneer looked at his callouses, his makeshift implements, his tiny hut—all creations of his own. He looked at his neighbor, and with a glow in his eyes, he replied: "A staff. I will not cast it on the ground—I will hold it for the future."

The pioneer in the United States and in the earlier colonial days has been the same rugged individual. He has worked, and planned optimistically, holding thanksgiving services for the little that he had and taking the hardships as they came. The pioneer who has gone before us has always been the one to look far into the future, to plan for it, and to work for it. He is the foundation of this, our country.

THE CONQUEROR: The second type is the conqueror. He, too, has come into all the lands of the world and has ridden swiftly across them. He is the barbarian, the Roman, the Genghis Khan, the Cortez, and the Custer. He is the one who, with selfish arrogance, has ridden in with the battle cry and the war-making instruments. He has ridden in, and behind him has lain a torn and bleeding earth. Behind him has been devastation, sickness, heartbreak. The warrior of the bloody battle is not the only conqueror. Read the book, *Robber Barons*; read the stories of the so-called "conquering" of the great Northwest; read of the "conquering" of the Great Plains by tractors and big-time farmers. Read the story that is now being written wherever men think only of their fields as great places of production and not as places to bring bread, beauty,

and brotherhood to all the world. The conqueror is still riding, still destroying. The future of our day depends upon it, we say, but that raises the question: "What have we in our hand?"

THE SERF: The third type is the serf. This is a term that is coming back into use since Hayek's book, *The Road to Serfdom* hit the bookseller's table. My own characterization of the serf is this: He is, in his own mind, the last of all men. His task is to live from day to day and perhaps to the end of the week. Although he may be young in years, he is old in mind and thought. There is little refreshing about him. His is the air of a pessimist. Nothing good can come, so let come what will. The serf we have with us. When asked: "What have you in your hand" he turns, looks, and says, "A serpent" and casts it on the ground where it soon devours him and his people.

To illustrate these three master types let us take one farm. It is a farm that is owned by the same family that owned it when the grandfather, a true pioneer, came upon the land and settled it, paying \$5 an acre.

For many years he worked the land, raising his own horses and raising his own flour. For many years he and his wife lived there happily and raised their family in true pioneer fashion. But gradually they became rich and as wealth was added to their possessions they began to exploit the land. Hordes of hired men came. They drove teams of mules with gangplows and plowed everything in sight. They raised wheat and corn, and the old pioneer died.

Then came his son. His was the attitude of the true conqueror. He could see before him only the acquisition of more land and more wealth. He saw that in his hand was a conqueror's staff. He used it to buy more acres, to farm more land, to hire more men and to run more plows.

He died. His son was caught, as they say, on the downgrade. Things went from bad to worse. He had in his hand the staff of the serf, but he did not know it. He believed that it was his job to hold that which he had, and this he tried unsuccessfully to do. No longer could the land produce crop after crop of corn and wheat. No longer could he raise the cattle that he did because men would not work for him at puny wages. The third generation had cast down his staff, and the serpent was beginning to devour.

Then, I noticed the land. For one mile there was little but swamp and gullies. The huge, picturesque hill was no longer a place of beauty but lay groggy with age and mistreatment, exposing its sore, cut sides to wind and water.

I walked to school with the son of the great-grandfather and we played cops and robber and cowboy and Indian in the huge gullies.

I walked to school with the son of a serf who was brought up in pessimism and lack of hope for the future. That boy did not become a farmer like his father and grandfather and great-grandfather. Today he is a clerk in the office of a county treasurer.

But in all this dark picture from hardy pioneer to conqueror and back to the role of serf, there is a ray of hope for the man who sees farming as *a way of life*.

At Thanksgiving time I visited this farm again. There is a second son. When asked: "What have you in your hand?" he did not cast it down and flee from the serpent, but rather he answered: "A staff!" and began to do something about it. With the son at the time was a work unit conservationist of the Soil Conservation Service. He brought with him facts, figures, and suggestions—and the hill began to have a chance.

But I was not so much interested in the hill, the grass waterways, and the fine new dam that has been built there, as I was in the change that has come over the family. No longer would they be classed in the group which we call serfs. Now they rate as pioneers once more. The new spirit has enfolded them—the spirit of hope and confidence. The staff is once more in their hand. They have grabbed the serpent by the tail, and have changed it into a staff of helpfulness that leads them on into a future being built not selfishly for themselves but for their children's children.

Thus, we begin to get the whole picture. God is constantly challenging us to look, "What is that in your hand?" We answer always sometimes as the conqueror, saying, "All that is, I hold in my hand!" and we lay waste to the land and leave it only for the serf. Sometimes we answer as the serf and say: "Nothing. All that I see is a serpent which will devour me or my children."

Sometimes we may answer as the pioneer and say, "A staff." And with that answer goes all the hope of bread, beauty, and brotherhood.

"We All Must Work Together"



They raise cane, and in a few hours the scum must be dipped off the top of the syrup that's a-making. E. J. Schumacher and A. B. Patterson (right) trade their work and their conservation ideas.

By A. B. Patterson

E. J. SCHUMACHER used his tractor to plow out L. L. Andrews' Bermuda sod where it was too heavy for a team to pull easily. C. D. Crocker sent his son over to help Dr. J. E. Burney fertilize and seed white Dutch clover. Crocker assisted George Boswell in cutting wood for fuel. W. L. Andrews supplied barnyard manure and helped L. L. Andrews seed pasture grasses.

That sounds like community action of the pioneer sort, a kind reminiscent of neighborhood logrollings and husking bees. In spirit, that's exactly what is going on in a good many soil conservation districts.

Farmers are helping each other to conserve the soil resource and increase crop production. Soil conservation districts call it group action. Schumacher, Andrews and the others are representative of one conservation group, located in the Bedias

NOTE.—The author is work unit conservationist, Soil Conservation Service, Fort Worth, Tex.



This farmer, E. J. Schumacher, pools labor with his neighbors to get conservation measures on the land.

Creek Soil Conservation District, Madisonville, Tex.

Schumacher has been designated group leader by the district's supervisors. He was named in August 1945, when the community's conservation farmers organized as the Oak Grove Conservation Group.

It is part of Schumacher's job to get his group together occasionally to talk over ways to do better conservation work. Sometimes a district supervisor attends and helps in the discussion. At other times a Soil Conservation Service technician may be on hand with the latest ideas on conservation farming. Such meetings are held several times a year.

"I've found the men in this group so interested in doing the conservation work that I don't have to ask them to cooperate," says Schumacher. "They can see for themselves that there are a lot of jobs—sodding Bermuda grass, for example—that two men working together can save time on.

"We couldn't hire labor if we wished. There isn't any available. We have to work together. But we want to, anyway."

Schumacher himself is a main force in the success of the young Oak Grove Conservation Group. A resident of the community only two years, he already is accepted by the farmers of the area as an "old timer" because of his helpfulness.

In addition to plowing out sod in a cultivated field where L. L. Andrews' mules would have had

a tough pulling, last fall Schumacher helped both L. L. and W. L. Andrews spread 20 percent phosphate on their pastures and cultivated land preparatory to seeding white Dutch clover and hairy vetch. Schumacher used his tractor and fertilizer distributor in doing those jobs for the Andrews.

Schumacher has a power-saw attachment on his tractor which he uses to help his neighbors cut fuel wood. He is planning to buy a terracing machine to build terraces for himself and for other conservation farmers. Owner of a sizable barn, Schumacher made storage space available for L. L. Andrews and C. D. Crocker to store their phosphate in until they were ready to spread it.

But the assistance works two ways. Andrews brought his slip up and helped Schumacher with necessary terrace fills and other terrace maintenance.

There isn't any need to hunt for examples of group action in Oak Grove. They are numerous. George Boswell helped Crocker spread phosphate in preparation for seeding hairy vetch and white Dutch clover. Boswell brought his tractor along for the job. He pulled a fertilizer distributor owned by supervisors of the district.

Boswell has a syrup mill. He cooks while L. H. and W. L. Andrews and Schumacher clean the cane patches each owns. That's the way conservation group action works. The farmers all help each other.

Conservation work in the new group is just getting under way. Planting the winter cover crops, seeding the clover in pastures and meadows, building terraces and outlets, and mowing grasslands to control weed competition are some of the measures the district cooperators have instituted.

Schumacher's farm, as well as his work for the other group members, provides a good example to the community. He was following a number of conservation measures even before he became a cooperator of the district.

He's had good results from hairy vetch. One plot grew an excellent crop during the winter of 1944-45. "That was a piece of ground where a fellow who used to operate it said nothing but goat weed would grow. All it needed was a good

vetch crop followed by field peas to mellow up the soil. I grew the peas last summer. The field'll grow anything now," maintains Schumacher.

Schumacher cultivates some land, uses other acres for pasture and meadow, and has some woods as a source of fuel. He grows considerable feed for his 48 head of cattle, 7 horses, and 2 mules. Corn and alfalfa are the principal feed crops, with sorghum helping out. The hairy vetch provides a certain amount of forage in winter, but Schumacher likes to get all the growth possible on his vetch so he can turn it under as green manure.

An area of new ground which Schumacher broke out in 1945 made him 61 bushels of hybrid corn per acre. He fertilized the field. Yellow dent fertilized the same way on an old field made 38 bushels. The local average is around 12 bushels. Schumacher's yellow dent had the benefit of a soil-building legume.

This year Schumacher is trying an experiment his neighbors are watching closely. He has planted alfalfa on upland. The group leader spread a ton of lime to the acre under the alfalfa. He

then applied 200 pounds of phosphate to the acre. After he gets a first cutting off the alfalfa Schumacher will top dress with nitrate of soda. If it works out satisfactorily, several of the men in the community plan to try some alfalfa next year.

There are 1,863 acres in farms in the Oak Grove Conservation Group. Schumacher owned 475 of those acres. "All of us see that we have to do conservation work to hold our land," he says. "We've got to build up our fertility and productivity. The conservation measures designed for my farm are helping my place materially—look what the vetch is doing to that old goat weed field. It has put it in production. If my work helps any one else to have a better farm and a better living, I figure it's worth doing.

"Our farmers need to work together. Too much erosion on my neighbors' farms will eat back on my place in one way or another before long. If they don't make a pretty good living we can't support a good school or good church. This conservation group is merely using common sense. We all must work together."

(Continued from page 208)

Four communities have constructed metal flumes to replace the leaky *canoas*, and there are demands for still more of them. The flumes are on the *Acequia de Penasco in Rio Lucio*, on the *Acequia de la Otra Banda*—"the ditch on the other side" on the *Acequia Madre del Pueblo de Taos* and in *El Valle de San Miguel*. They benefit 365 families who once never knew from week to week whether there would be enough water.

One *Taoseño* who was the most reluctant to submit to outside help is Blas Chavez, of Los Cordovas. His family is a new one, according to Taos standards. His grandfather was its first member to farm in New Mexico. Today Chavez proudly discusses the improvements made on his farm.

"All I have to do when I want to irrigate now is send my kid to turn the wheel. Before, when we had the most water, we couldn't irrigate.

Blas Chavez gets irrigation water for his land from the *Acequia Madre de Los Cordovas*, which starts about three miles from his farm, where it is diverted from the *Rio Grande del Rancho*. Last spring he and his neighbors contributed 400 man-days of labor to build a heading for their ditch, thereby ending flooding, ditch labor and repair. The heading controls the amount of water that flows into the *acequia* from the *Rio Grande*

del Rancho, and when the Rio floods now, the farmers have only to close their heading to save their *acequia*. It also gives them two crops of alfalfa instead of one, because they get water earlier.

Blas Chavez was a member of the New Mexico State legislature in 1937, and it was during that session that the law legalizing the formation of soil conservation districts was passed. Blas voted against it, but he is now a supervisor of the Eastern Taos Soil Conservation District.

"The people had been forgotten too long. They were afraid of any legalities—afraid that they might be swindled out of what land they have left. But they have come to understand, little by little, and I think now that Taos County is the most blessed county in the State."

Because of their labors, 593 families who cultivate 5,000 acres of land in Taos County now know a more certain living. When other lands of the Southwest have changed hands a dozen times, and have been turned over to commercial enterprise, the subsistence farmers of Taos County will undoubtedly still be on their slopes, figuring new ways of keeping their livelihood intact, and new and more permanent methods of bringing water to their fields.

Joe Now "Lives at Home"

By Louis E. Reid, Jr.

CONSERVATION farming methods are helping Joe Anderson, negro cooperator with the Harrison County Soil Conservation District, who lives near Marshall, Tex., conduct a successful, profitable farming operation on 122 acres of land which only cost him \$11 an acre when he bought it in 1929.

Erosion control measures and diversification—getting away from having nothing but one crop of cotton after another—have been key points in Anderson's success on the 122 acres.

After he first bought his farm in 1929 Anderson got along all right for a few years, but he kept noticing that each heavy rain washed more topsoil from his fields down the creeks and into the river. Crop yields steadily diminished. In 1941 Anderson made only a bale and a half of cotton on 6 acres and the year was considered a pretty good one for growing cotton.

That was when Anderson went in to see his soil conservation district. With technicians of the Soil Conservation Service assigned to aid co-operators with the district, Anderson went over his entire farm, and together he and the technicians worked out a plan which would make the best possible use of every acre and every field on the place.

The results of Anderson's signing up with the district showed up at the end of the very first year. In 1942, 6 acres on his farm produced 3½ bales of cotton—more than twice as much as the good year of 1941 had produced on the same amount of land.

A crop rotation was partly responsible for the additional yield. Anderson had planted hairy vetch as a cover and soil improving crop. Vetch, a legume, had added needed elements to the soil and the increased cotton yield followed.

Anderson's rotation now consists of cotton and corn interplanted with cowpeas in combination with hairy vetch. He raises each year a few acres of cowpeas and peanuts for hay and an acre or two of cane, sorghum and potatoes.

NOTE.—The author is information specialist, Soil Conservation Service, Fort Worth, Tex.

As another phase of his conservation farming system, Anderson has built 3.8 miles of terraces on 56 cultivated acres, doing the work with a team and turning plow. His terraces all empty into well-sodded bermuda grass outlets established before starting the terraces.

Anderson is a great believer in bermuda. Noting a small wash at a point where a terrace emptied into an outlet channel, he immediately picked up his shovel and went to work. "I'll put some bermuda grass in here," he said. "Then it won't wash."

Anderson doesn't go along at all with farmers who don't want bermuda on their farms, "I've learned that fighting and cussing bermuda is like arguing with your wife," he says. "You can't win. The best way is to get along with it, learn to handle it, and then you can have it solving more problems than it ever created."

With a start of 9 head of cattle when he signed his agreement with the district in 1941, Anderson increased his herd until he now has 18. He believes that by clearing sprouts from his 49 acres of pasture, buying a mowing machine and using it regularly he can build up his herd to 36 cows. This, and the establishment of a good Kobe lespedeza meadow, are among his immediate plans for the future. He will be financially able to carry them on, since he has been putting money away regularly in the form of war bonds.

He has a source of immediate cash, if he cares to sell, in a 28-acre woodland, but at the advice of Soil Conservation Service technicians he has decided to let his 8- and 10-inch trees stand several more years before harvesting them under selective cutting methods. It will mean more money in the long run.

Anderson has two boys in service, one in the Navy, the other in the Army. He says that terracing, contour cultivation, crop rotation, and use of soil improving crops have enabled him to grow more on fewer acres with less labor.

A small orchard, a good garden, plenty of chickens, eggs, milk, butter, and a year's supply of pork in his hog pasture and his sound conservation farming methods allow Anderson to "live at home."

Twenty million acres of American land are devoted to roads and highways. They constitute an opportunity for erosion control and for the encouragement of wildlife.

REVIEWS

TWO BILLION ACRE FARM, AN INFORMAL HISTORY OF AMERICAN AGRICULTURE. By Robert West Howard. 209 pages. Doubleday Doran & Co., Inc., Garden City, New York, 1945.

"This is the story," writes Mr. Howard, "of a 1,940,000,000-acre farm and of its cultivation between 25,000 B. C. and A. D. 1944." Most of the story is about agriculture and the many factors bearing on it in the United States from Colonial times to the present day. All of it is sketched in racy, robust writing, and most of it is very well done.

Here is the history of the cotton gin, of condensed milk and tin cans, of barbed wire, fertilizers, and frontier life, and of farm machinery, grasshopper plagues, California orange groves, and a wide variety of other things, all told with vividness and savor. But the author does more than this. In the last half dozen chapters he traces the trend of population and economic power from country to city, studying the relation thereto of the Grange movement, Farm Bureau, the United States Department of Agriculture, and the urban industrialist. He shows how "in the shadows and breathlessness of urbanism the family life and religious convictions were dying"—and how, in contrast, the landmen held "a sense of individualism * * * family pride and cooperation, * * * faith in a Creator and a Creator's things * * *."

There follows an analysis of agricultural control as practiced by the centralized powers of the Government and big industry, ending with the comment that we had arrived at a "regimented bedlam" at the beginning of the last war. "Meanwhile, out on the land itself * * * the individualists were building another road back to economic parity for agriculture"—by means of farmer cooperatives. "Through them * * * could return the economic equality, the classlessness, the strong family ties and individualism that Government had been trying to regain, through centralization, all along."

The strong farmer cooperative movement will influence the decentralization of Government and industrial power. "This will mean, inevitably, an end of the American city as we have known it for the past one hundred years, and a return to village or farm life for the bulk of the population." The original objective of the migration to North America, declares the author, "was *ownership of land* and resultant *family security*." The city has proved its inability to fulfill either of these human urges, and, with the "development of the automobile, the radio, the streamline train, the rural electrification projects, plus the potentials of World War II discoveries * * * has itself become economically passe."

"So the path of America's future leads back to the land * * *. It will be a return to the seasonal work program of the medieval manors, operated this time by freemen and simplified by machines: work on the land in summer months; work in factories or some other form

of craft or professional project in winter months * * *. The home * * * would again become the bulwark of American life. Human roots would sink deep and true into the good earth. The valued inches of topsoil—the one constant, seasonally recurring asset of the Nation—would become a common word instead of a mining property exploited by one-fourth of the population because of the cash economy of the three-fourths living in cities."

"Then, and then only, under the stars and in full realization of the directive forces beyond the ken of human knowledge, secure in land and family, America can set a true pattern for world peace and world security."

—William R. Van Dersal.

CHARTER FOR THE SOIL. By John Drummond. 219 pages, illustrated, bibliography. Faber & Faber, Ltd., London, 1944.

John Drummond has written a thought-provoking book on agriculture. You may not share his views but you will like John Drummond.

He introduces himself as a small Scottish laird, trained in the ways that have come down from father to son for the past 800 years. He tells us in his foreword, "In 1928, I came to the conclusion that the landlord-tenant combination was played out. I devised a new system to replace it; estimated my plan to take, with the cash available, twenty years to complete. At the moment I farm seven farms, and have the central organization in working order. During the last fifteen years I've thought a bit, and read a bit, even listened a bit—I believe my plan is applicable to the country as a whole. This book, then, is a plan for the future of British agriculture—a plan which is intended to place it on a footing comparable with that of other industries; to put it in such a position that it will pay its way without subsidies; to reorganize it so that it can provide fresher foods to the consumer; to plan it for freedom from slump and political whims. * * *. But this book is not a book of fashion; remember that, for I am going to take a running kick at a whole crowd of fashionable scientific theories."

"Charter for the Soil" does indeed find flaws in many accepted ideas of scientific agriculture. But John Drummond is no crank and his views are reasonable, stated without equivocation. Readers may sometimes become impatient with the way details are dovetailed into major discussions, but these seemingly minor points help to make clear what the author wants us to think about.

The author incorporates many ideas imported from the United States, but sometimes he is a bit vague on our geography, as when he places our "Dust Bowl" in "fertile cotton lands of the past." If John Drummond spent a year touring the United States, his plan would benefit from study of our local soil conservation district operations, our farm and fruit cooperatives, and our erosion-control practices. But, quoting John Drummond, any plan is made to be improved—life never stands still.

—S. B. Detwiler.

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WELLINGTON BRINK, EDITOR

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Front Cover: Contour garden of Wilbur Runk, Cumberland County agricultural agent, Bridgeton, N. J., 1944. For timely discussion of contour gardening, see Mr. Pryor's short article, "Well-Rounded Gardens," elsewhere in this issue.

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COME-BACK of a COMMUNITY

By George A. Wood



Nopal looks like this today. Thirty years ago more than a dozen buildings faced its main street.

NOPAL is a lonely-sounding Spanish name for a variety of cactus. It also is the name of a little agricultural community on the DeWitt-Gonzales county line in south central Texas that is winning a game fight to avoid the doubtful distinction of becoming a ghost town.

The community at one time was quite prosperous. Founded in 1890, it had a population of some 50 persons about 1910 and 1915. Nopal supported a gin, a general store, a school, a church, two dry-goods stores, a blacksmith shop, a drug store, a doctor's office, and a saloon and dance hall.

The fields surrounding Nopal were productive. More than 15,000 of the 25,000 acres right around the town were in cultivation. One year the gin handled 1,700 bales of cotton. That was more than a generation ago.

There was 1 year within the past decade when the gin handled only 36 bales. Last fall, 1945, however, the same gin took care of 333 bales.

The land isn't so productive as it was once. There aren't nearly so many acres in cultivation, either. Instead of 15,000 acres under the plow,

there are less than 6,000. And these acres produce lower yields.

Needlegrass, an indicator of low fertility, has "taken" many fields. It has little grazing value. Other fields are covered with dense brush. Gullies furrow each hill. Sheet erosion has robbed many fields of the ability to produce well under cultivation.

As the fertility and productivity declined, the



Nopal's houses, many of them, are unoccupied and falling down. Occupants had to move away because the land became too unproductive to afford a living.

NOTE.—The author is district conservationist, Soil Conservation Service, with headquarters at Yorktown, Tex.

people left. They had to make a living and Nopal couldn't provide it. Only 12 persons voted in the last presidential election. But there was a time when that same box counted 120 votes.

The only buildings left in the formerly thriving business center are the gin, the blacksmith shop, a general store that serves also as trading center and postoffice, and the church, which is used only on rare occasions. The nearest school is 2 miles away.

What caused the decline? Plowing up and down the slope, for one thing.

Cultivating land that should never have been taken out of native grass is another cause of Nopal's trouble. Some of the land on the hillsides is too steep to cultivate safely—erosion can't be controlled there. But centuries of grass had built up enough fertility on the hillsides for them to produce well for a few years before erosion removed their vigor.

Failing to restore the organic matter and fertility to the soils is a third reason Nopal can't support so many people as formerly. Soils need building up, constant replenishment. When all the fertility is taken out by crop after crop and by progressive erosion, the productivity is gone. Legume and grass crops which put nitrogen and organic matter in the soil were needed in Nopal, but no one realized that need until almost 19,000 acres had washed severely.

There are many reasons for Nopal's decline, some of them economic and some social. All relate directly to erosion on the farms and their resulting inability to produce profitably.

Now, recognizing that erosion has to be controlled and soil productivity built up before they

can make a reasonable living, Nopal farmers are hard at work to make their community a good place in which to live. They got their start in using conservation farming methods from Joe Wischkaempfer, one of the supervisors of the Middle Guadalupe Basin Soil Conservation District. Wischkaemper, during frequent visits with friends in the Nopal vicinity, kept stressing the values of conservation operations.

Finally Carl Hattenback became interested enough to do something. Hattenback talked with his neighbors. Then he talked with the supervisors of the soil conservation district. The upshot was formation of the Nopal Conservation Group within the district. Hattenbach was named leader.

Working through the group, the district sent technicians of the Soil Conservation Service. The farms of the Nopal district cooperators were planned as a unit. Farmers and technicians knew that erosion pays little attention to property lines. Conservation group action has been growing ever since. Last fall a number of the members at Nopal worked together during harvest. Some of the co-operators have purchased farm equipment together.

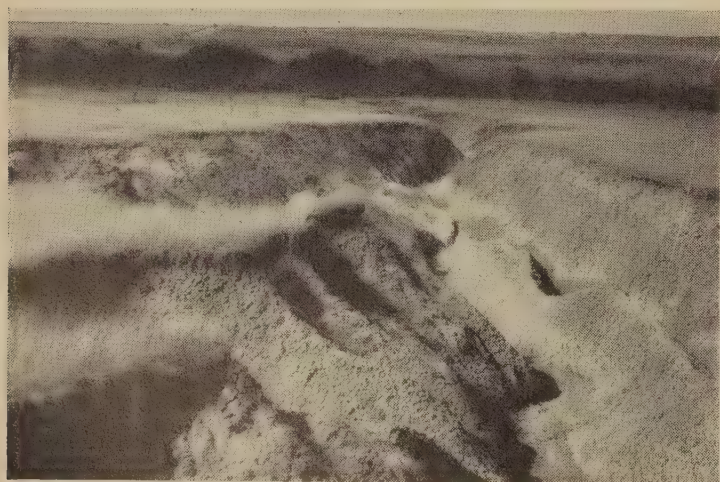
Planning the Nopal Conservation Group farms as a unit has involved making a coordinated soil and moisture conservation plan by each farmer. The owners and land operators have had the help of Soil Conservation Service technicians. The conservation measures on each farm vary as the needs vary.

Willie Metting, for example, has planted Rhodes grass meadow strips in natural drainageways on his place. After seeding early last spring, Metting's grass did well and by fall was providing adequate covering to keep the drainageway from eroding when terrace run-off water coursed through.

Another cooperator in the vicinity, C. J. Mueller, is putting his entire farm in pasture. He uses Rhodes grass as one of his principal pasture plants. Mueller has found that the grass helps control erosion and at the same time provides good grazing. He was able to cut 10 tons of hay off the Rhodes grass last summer, only a few months after he planted it. There was some Johnson grass with the Rhodes grass.

Ewald Metting uses a conservation crop rotation each year, alternating legume crops in the winter with cash crops in the summer. He has

(Continued on page 222)



Many of Nopal's fields look like this. Each 100 acres in the area has at least one gully six feet or more deep. Erosion has robbed the community of much of its ability to produce.



Rhodes grass is an important part of the coordinated program. Herefords grow fat on good pasture grasses of the sort shown here.



Bluestem is one of the good pasture grasses being used on eroded lands to help Nopal fight its way back to prosperity.

(Continued from page 220)

found that Austrian winter peas, when inoculated and fertilized with superphosphate, are his best winter cover crops. Ewald Metting uses these crops to control wind erosion on his peanut fields during winter and to improve soil structure and productivity. Another conservation practice he uses is to plow his corn and cotton stalks into the top few inches of soil immediately after harvest. The crop residue helps prevent wind and water erosion, conserves moisture by decreasing the rate of evaporation, and helps improve the soil.

Among many other conservation measures they use, Ewald and Willie Metting have installed terrace systems and cultivate on the contour where needed.

W. O. Baker is another conservation farmer at Nopal. Regularly he grows clover to keep his soil fertile and productive. Another measure he follows is the planting of winter pasture for his cattle. Baker has found Italian ryegrass excellent for that purpose, since it gives good grazing all winter and through early spring. The ryegrass does well at a time when little native forage is available.

A number of the Nopal cooperators use diversion terraces, as well as sod, to help heal gullies.

Conservation Group Leader Hattenbach has done considerable grassland development as part of his conservation program. He has installed a combination tame grass-native grass pasture that is paying off in profitable grazing. Hattenbach planted 10 acres of a 210-acre enclosure to Rhodes grass. On the rest of the area he has left native bluestem. To help the quality of the nourishment the pasture gives his cattle and to aid the plants in making good growth, he has applied superphosphate. Another pasture development practice he follows is mowing weeds to keep them from using up the moisture and plant nutrients which the better plants need. He always tries to mow just after the weeds flower, but before they seed.

Hattenbach adjusts the number of livestock according to the ability of the grassland to provide grazing. He rotates his cattle through permanent and temporary pasture so that they will have green forage as long as possible each season.

Willie and Ewald Metting, Baker, and Hattenbach are only a few of the conservation farmers in the Nopal vicinity who are operating their farms in a way calculated to control erosion while building up productivity.

They, and the other farmers there, have a long way to go before any sizable number of Nopal's acres are producing at their maximum. They've made a start. Nopal is now on the way back to agricultural prosperity.

WELL-ROUNDED GARDENS *(See front cover)*

THE curving rows of vigorous vegetables in the cover photograph of this issue are both symbolic and practical.

They are symbolic of the new tillage techniques which are advancing American agriculture.

They are practical because they protect the soil from erosion, arch enemy of farmers and gardeners all over the world. They are practical because together with other conservation practices they are increasing the yields on thousands of home gardens as well as on millions of acres of farmlands.

Home gardening—producing not only flowers but fresh, health-giving foods in spare time—gained countless new devotees during the war years. These people, who before had bought worn and weary vegetables and fruits in the markets, have found these important items of diet not only better to look at and better to eat when grown at home, but likewise exciting to produce.

Many of them have found likewise that adaptation of the modern methods the good farmer uses on his expansive acres have resulted in more and better vegetables and fruits. They have had more to eat fresh from the garden; more to can, preserve, pickle or freeze for winter use. And they have found also that these new methods give gardening a new interest, reduce the drudgery, and make it fun. Actually fun!

The fact is, most of the soil and water conservation farming methods that good farmers are using throughout the country can be adapted to the home garden, whether you're talking about contoured rows, mulching, diversions, or even simplified bench terraces. And all lead to better garden results than you've known before. These curving rows of vegetables are the visual symbols of a new and fruitful day for home gardeners.

William C. Pryor.

South Carolina's Program for Schools

By J. B. Douthit and Forrest Steele



Seventh graders in Mrs. R. L. Ballentine's room at Anderson, S. C., Junior High School establish some soil conservation practices in a sandbox. Left to right: Maurice Hubert Nimmons plants pine trees, Bobby Todd shapes a terrace, and Frank Lewis builds a meadow drainageway.

An old preacher once said to his congregation, "I don't care about you old folks, you're too sot in your ways ever to change. It's the boys and girls I'm trying to save."

SOIL conservation district supervisors in South Carolina know that if you teach a child to love and appreciate the soil and the earth's resources he will become a real conservationist, and in the

NOTE.—The authors are president of the South Carolina Association of Soil Conservation District Supervisors, and chairman of the board of district supervisors, Upper Savannah Soil Conservation District, Pendleton, S. C., and survey supervisor, Soil Conservation Service, Columbia, S. C., respectively.

meantime he will have a profound influence on his elders.

In 1943 it was agreed that more soil and water conservation information should be made available to teachers and pupils of the South Carolina public schools. The school curriculum was undergoing changes that were in keeping with the changing attitudes toward education. Under the leadership of State Superintendent J. H. Hope, many improvements were made: teachers' salaries were raised; a teacher recertification program was instituted; an additional year was added, making possible a 12-year public school program; necessary revisions in the curriculum were begun. One

of the most significant changes was the increasing emphasis on the child's environment and its influences.

The time was ripe for action. The need was there. The information was known, and available. Only the right start was needed, and the district supervisors were able to supply that. They went to the officials of the State Bankers' Association.

You don't have to be a follower of Henry George to understand that most of South Carolina's wealth comes originally from the land. Bankers of the State, as keen as bankers everywhere, were quick to recognize achievement in agriculture and to sponsor worthwhile agricultural movements. Increased attention to soil conservation very naturally drew their full support. As one man expressed it, "Who knows better than a banker that you must protect your capital—in the farmer's case, his soil resources."

When an essay contest on soil conservation for public school students was suggested by an upper Savannah district supervisor, the bankers' association heartily agreed to sponsor it in cooperation with the State Association of Soil Conservation District Supervisors. Aid was easily obtained from the vocational agriculture teachers, 4-H Club workers, Soil Conservation Service men, and interested school people. To give the idea State-wide circulation, to furnish information to a host of school children and their teachers who had almost no pertinent material, was a huge task.

Spearheading the move to get more soil conservation information to the school children of South Carolina were E. C. McArthur, a supervisor of the Broad River Soil Conservation District and at that time president of the South Carolina Association of Soil Conservation District Supervisors; E. R. Alexander, secretary of the South Carolina Bankers' Association, and State Superintendent of Education Hope.

The contest ended in the spring of 1944 with a deluge of essays—more than 5,000. They were excellent, good, bad, and worse, but everyone showed genuine interest, and a willingness on the part of the pupils and their teachers to grapple with the basic problem of the soil. Essays came from every county in the state. They discussed everything from saving orange peel to proper use of waste land on the coast. Most of them, however, revealed a definite need for more accurate information on the soil-conservation problems of

the State. Lack of knowledge of coastal plains problems was particularly apparent.

With this need for information in mind, the district supervisors invited a group of people interested in soil conservation work in the State, and education leaders, to meet at Clemson College in June 1944, to plan for action. Attending were representatives of State department of education, State department of vocational agriculture, Clemson Agricultural College, experiment station, Extension Service, South Carolina Association of District Supervisors, South Carolina Bankers' Association, and Soil Conservation Service, as well as superintendents of several schools. Recognizing the need for appropriate teaching material for the children in the upper middle grades, this committee took steps to make it available.

A committee of three teachers was selected to work as collaborators of the Soil Conservation Service under the direction of T. W. Webb, assistant State conservationist, and Miss Lena Moore of the State department of education. These teachers were Misses Claudia Pounds, of Ninety Six; Evelyn Jones of Ware Shoals; and Golden Brooks, of Taylor School, Columbia. They prepared an instructional unit on soil conservation to be incorporated in the course of study. As the work seemed to fit most naturally into the subjects taught in the sixth grade, the material was prepared with the sixth grade level in mind, but it was not restricted to the sixth grade. The judgment of Verd Peterson, State supervisor of agricultural education, was invaluable in fitting the study of soil conservation into the curriculum.

In addition to the instructional unit for teachers, a story for the children, entitled, "Over the Hills to the Sea," was written by the committee, and published in attractive form by the State Bankers' Association. Both the instructional unit and the story were approved for use by the State Board of Education.

It was realized that a most important step in getting soil conservation taught in schools is to interest the teachers and school superintendents in the subject. Several steps were taken to accomplish this.

Miss Jones and Miss Pounds discussed their views of soil conservation at the State meeting of district supervisors in August. A story, *A Teacher's View of Soil Conservation*, was written by Miss Evelyn Jones and appeared in the November 1944 issue of the *South Carolina Education Bulletin*.



Nancy Welch and Marion Woodward, seventh-grade pupils of Mrs. Frances Kitching, Anderson Junior High School, discuss soil conservation posters they have made.

tin which is published by the South Carolina Education Association and is sent to all school teachers and many laymen in the State.

Another story on the material for use in the schools appeared in the December 1944 issue of the same magazine. These stories were designed to stimulate interest in soil conservation on the part

of the teachers throughout the State. Still another article on the subject was in the December 1944 issue of *South Carolina Education News*.

Teachers and school officials in selected schools throughout the State were called together to discuss the material and its possible use. These meetings were conducted by representatives of the State



It may take a thousand years for heat, cold, water, animals and vegetation to build an inch of topsoil from rocks such as Mrs. Kitching's students have collected. Teacher discusses this with Betty Shirley and Bobbie Gleason.

Department of Education, State Bankers' Association, Soil Conservation District Supervisors Association, and Soil Conservation Service.

No attempt was made to distribute information to all the schools for the season of 1944-45. Instead, 26 widely distributed schools were chosen for a concentrated effort to gain the necessary interest and to make the course successful in those schools.

Now that another spring season is at hand, the number of schools planning to teach soil conservation is greatly increased. We do not know just how many will carry the work this year. However, in the Upper Savannah Soil Conservation District, which includes Pickens, Oconee, and Anderson Counties, the number will rise from 5 last year to 26 this year—or as many as there were in the entire State in 1945. Teachers, superintendents, and pupils are responding with enthusiasm.

T. E. Mabry, superintendent of schools in Westminster, says: "People do not realize how much influence pupils have on their parents. The study of soil conservation in our school has aroused more than the interest of the pupils; the parents, likewise, have become interested."

Although many pupils live in town, their parents own farms and are vitally interested in farm lands. Recognizing this fact, T. H. Ulmer, principal of one of the Anderson city schools, said, "More material for soil and water conservation should be put in school libraries and made available to boys and girls."

The superintendent of Williamston schools, A. B. Hair, Jr., commented: "In my school where

pupils used the booklet, 'Over the Hills to the Sea,' more than 200 adults also read the booklet. Most of these were people who live on the farm."

Georgia L. Hamlet, an Anderson County teacher, gave this report on the unit she taught: "The material on soil conservation was very helpful to my class. We used it for reports and as a source for securing general information on soil, soil erosion, and the conservation of soil in our States. The pupils' interest was keen because they were able to apply their science to real life. From the study of the soil conditions around them they could understand their textbook better. I wish we could have had more pictures on soil erosion and ways of controlling it. Samples of the different types of South Carolina soil would have helped; also, films on soil conservation could have been used to advantage."

One teacher reported: "Some farmers have placed their farms under soil conservation plans in cooperation with the district because of the interest of their children in what they learned at school. The irregular attendance of some children from farm homes ceased to be a problem of the school. The interest in the study of conservation led to regular attendance and a better attitude toward all school work."

From the pupils themselves came many comments: "The pictures were good. They told a good story about conservation in our State," said Elizabeth Manning.

"The book would be better if it had more pictures of people in it," remarked Joyce Fields.

"Our State is wasteful with her land. This book shows this very clearly," pointed out Clarence Mize.

The soil-conservation district supervisors look to the day when South Carolina's land resources will be in the hands of a generation of men and women who learned while they were children to love and appreciate the State's soil. When this takes place, we shall be winning the battle to save the land.

QUERY THE EDITOR

New ideas, new contributors, are welcomed by *Soil Conservation Magazine*. It is suggested that writers first inquire by letter as to the suitability of a proposed article, including a brief synopsis.

Pensacola Bahia grass sprig-planted in rows at Thorsby, Ala., nursery.



This is how the grass looked one year later. The soil was sandy.



The Narrow-Leaf Bahia Grasses

By R. Y. Bailey



Harvesting seed of Pensacola Bahia grass with a combine at the Soil Conservation Service Nursery, Americus, Ga.

GRASSES that produce good ground cover on upland soils and that make large yields of seed that can be harvested easily have long been needed in the Southeast. In planning the use of land on farms, it is highly desirable to provide for a combination of grass pastures and perennial legumes for pasture, so that each farm will have a well-balanced grazing program. The lack of grasses that could easily be established on upland by direct seeding has handicapped farm planners in the cotton belt.

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Spartanburg, S. C.

Into the picture recently have come two new grasses that appear to be a considerable part of the answer to our requirements. These are the Pensacola and the Wilmington narrow-leaf strains of Bahia grass (*Paspalum notatum*).

Paul Tabor, who is in charge of the observational nurseries of the Soil Conservation Service in the southeastern region, found a grass growing on lawns and along the sides of railroad tracks at Pensacola, Fla. This grass looked promising to Tabor and he collected a small amount of seed for trial in the observational nurseries. Later he

went back to Pensacola and got a small quantity of sod which also was planted in the nurseries.

County Agent E. H. Finlayson, of Escambia County, Fla., also found this grass and was attracted by its growth and seeding habits on the sandy soils around Pensacola. In a recent letter Finlayson said, "I first noticed this grass when I started work here in November 1935, but did not think so much of its possibilities until early 1938 when a sand bank between my residence and office was sodded to it. I harvested a few seed that summer for George E. Ritchey of the Florida Experiment Station to try. These seed were improperly harvested and showed very little germination.

"In 1939, after a more careful study of the seeding habits of the plant, I harvested 14 pounds more of the seed which were sent to Mr. Ritchey and scattered around among dairymen and farmers in the County, a pound of seed going to each of two farmers in Jefferson County.

"In 1941 I succeeded in harvesting about a thousand pounds of seed off the streets. Local dairymen and others, whom I had interested in the grass, harvested possibly 500 pounds of seed that year.

"I harvested 2,400 pounds of seed in 1945 from a 32-acre planting that I have on a farm which I own in Jefferson County. Twelve acres of the planting were seeded in 1942 and the balance in the late summer of 1943."

It is of interest that Finlayson and Tabor, working independently of each other, were impressed with the possibilities of the grass. Each of the two, without knowledge of what the other was doing, proceeded with plans to get the grass into production.

Tabor's collections have grown into rather extensive Soil Conservation Service nursery plantings of approximately 265 acres. Seed was harvested from approximately 50 acres in 1945 and the entire acreage will be available for harvesting next year. The 16,000 pounds of seed harvested in 1945 was granted to soil conservation districts for the establishment of 5-acre seed production areas from which additional seed will be harvested and sold locally to farmers who want the grass. At a seeding rate of 20 pounds per acre, this will give an increase of approximately 800 acres for seed production on farms.

Pensacola Bahia was planted at Service nurseries at Chapel Hill, N. C., and Sandy Level, Va.,

for further observation. It grew well at both places but the stand was severely thinned by cold. Chapel Hill and Sandy Level were simply too far north for this kind of Bahia grass.

In the meantime, Tabor still was looking for useful plants. In his search he found another narrow-leaf Bahia grass at Wilmington, N. C., that looked much like Pensacola Bahia. When planted at the nurseries, however, this new kind that Tabor calls Wilmington Bahia was not injured by the winter temperatures that so severely thinned the stands of Pensacola Bahia. So, out of his patient search for better grasses, Tabor has found two that may prove useful; one in the lower and the other in the middle South.

Wilmington Bahia differs slightly from Pensacola Bahia in that the seed heads tend to droop slightly as they approach maturity, whereas Pensacola stands upright until the seed is fully mature. Otherwise, the two are outwardly the same.

Although the two grasses are outwardly similar, they vary definitely in cold resistance. After it was learned that Pensacola suffered severe cold damage at Chapel Hill where Wilmington was not affected by winter temperatures, it was decided that a line must be drawn as a guide in the future distribution of the two grasses.

Since Pensacola Bahia has made such a promising start in the lower part of the region, we wanted to use it wherever climatic conditions would permit. Pensacola Bahia suffered no winter damage at the Thorsby, Ala., nursery. This indicated that the dividing line between the two grasses could be drawn north of Thorsby. In establishing the line, soil conservation district boundaries were followed, in a general way, for convenience. As a result, the line varies considerably from north to south. In all cases, however, we tried to keep the line far enough south to be sure that Pensacola Bahia was not taken too far north.

Reading from west to east on the regional map, the line follows the northern boundaries of Warren, Madison, Leake, Neshoba, and Kemper Counties in Mississippi; Sumter, Greene, Hale, Bibb, Chilton, Coosa, Tallapoosa, and Chambers Counties in Alabama; Troup, Meriwether, Talbot, Taylor, Crawford, Bibb, Twiggs, Wilkinson, Washington, Johnson, Emanuel, Bulloch, and Screven Counties, in Georgia; and Hampton, Colleton, Dorchester, Berkeley, Williamsburg, and Georgetown Counties in South Carolina.

If the weather and other conditions are favorable for seed production in 1946, sufficient seed of Pensacola Bahia should be harvested to establish one or more 5-acre observational and seed-production areas in each county in all soil conservation districts south of the Wilmington-Pensacola line.

Production of Wilmington Bahia seed is not so far advanced as is that of the Pensacola Bahia. Only enough seed was harvested in 1945 to establish one 5-acre observational and seed-production area in each of 12 counties north of the line. Production of Wilmington Bahia seed is being expanded as rapidly as possible and it is hoped that in 1946 enough seed will be harvested to establish observational and seed-production areas in an additional 40 to 50 counties north of the line.

It is not the policy of the Soil Conservation Service to produce any seed for general distribution to farmers. Seed will be distributed to soil-conservation districts for further observational plantings on farms. Sufficient seed will be fur-

nished to plant 5 acres on a farm. Personnel of the Soil Conservation Service nurseries will follow up these plantings to further observe the behavior of the grasses under farm conditions. These observational plantings will be located on farms where harvesting equipment is available so that if the grasses are sufficiently impressive under farm conditions seed may be harvested. Seed harvested on each farm will belong to the farmer who may use it to further expand the acreage on his own farm, or may sell seed to other farmers who want to establish the grass on their farms. Of course, if the grasses do not make a favorable showing in these observational plantings, farmers will not wish to harvest seed.

It will be our policy to furnish seed of these grasses to state agricultural experiment stations for any plantings they may wish to make.

By following the policy outlined, the Soil Conservation Service will continue the production and harvesting of seed only until a sufficient number

Paul Tabor examines seed heads of Wilmington Bahia grass at the Soil Conservation Service Nursery, Rock Hill, S. C. Note the drooping seed heads.



of seed blocks are established to insure the general distribution of seed to farmers who may want it.

Although northern limits have been set for the distribution of Pensacola Bahia no such limits have been fixed for Wilmington. This grass promises to be useful in upland pastures at least a little farther north than Dallis grass will survive the winters. If this proves true, its ability to grow well on upland and its extra winter hardiness may make Wilmington Bahia an important addition to the list of pasture grasses in the middle South. Much additional information must be gathered through field experience before the full possibilities of this grass will be known.

The narrow-leaf Bahia grasses have shown, in Soil Conservation Service nurseries, that they will survive and make a certain amount of growth on upland soils that are too dry for most other pasture grasses. No claim is made, however, that these grasses perform any miracles of growth on poor soils. Like all other grasses, they respond well to nitrogen and make vigorous growth or produce even moderately large yields of seed only when well supplied with nitrogen. Seed yields on poor sandy soils at Soil Conservation Service nurseries have been influenced very markedly by applications of nitrogenous fertilizers. At the Americus, Ga., nursery a liberal application of nitrogen early in the spring resulted in vigorous spring growth and good yields of seed at the first harvest, in late June and July. Yields at the second harvest were lower than the first and the third harvest was too light to be profitable. Appearance of the plants indicated that the applied nitrogen was used up early in the season and that nitrogen starvation limited yields of seed later in the season. Nitrogen starvation as a factor in seed production was further indicated by grass on small spots in the field where the fertilizer distributor missed. Grass on these unfertilized spots was characteristically pale in color and produced little seed.

Based on experience at the Americus Nursery in 1945, it appears that a second application of nitrogen immediately following the first seed harvest would stimulate seed production so that three crops of seed would be produced in a season instead of the two crops that were harvested.

Moisture also is an important factor in seed production. This was clearly shown at the Rock Hill, S. C., Nursery where a prolonged drought in the spring of 1945 caused a complete failure of the first seed crop of Wilmington Bahia. Seed heads

were formed, but the seed failed to develop. Summer rain resulted in fair seed production later in the season.

Experience gained in a small pasture at the Thorsby, Ala., nursery and in an acre planting in a pasture on the farm of W. A. Womack, Ashford, Ala., shows that Pensacola Bahia grass is eaten readily by livestock. Palatability of the Wilmington Bahia has not been observed, but general characteristics of the two grasses are so similar that it seems probable that this grass should be about as palatable as Pensacola Bahia.

We do not know how well these grasses will grow in mixture with legumes, but believe they will not differ greatly from Dallis grass in this respect. The kind of legumes will probably be different from those usually seeded on lowlands in mixtures with Dallis grass. Annual lespedeza or creeping beggarweed offer possibilities on upland clay and light sandy soils, respectively. Crimson and hop clovers also offer possibilities on upland soils where they are adapted. If no legumes prove adapted in mixtures with these grasses, application of nitrogen will be required for anything approaching maximum production of either forage or seed.

Progress with Pensacola Bahia has been sufficient to warrant the statement that both County Agent Finlayson and Plant Explorer Tabor have made an important contribution to the pasture possibilities of the lower South. Performance of Wilmington Bahia farther north can at least be described as promising. If this grass lives up to its early prospects, Tabor also will have made a very definite contribution to the pasture program in the middle South.

There is a possibility that these narrow-leaf kinds of Bahia grass may find a place as cropland grasses to be sown in a mixture with annual lespedeza that is to remain on the land two or more years. If this proves true, it will increase greatly the value of these grasses in sections where no suitable grasses for use in crop rotations are available.

This article is intended as a progress report rather than as an announcement that we have found new grasses that meet all requirements in upland pasture. We have learned to date that they will grow on uplands that are too dry for most other pasture grasses grown in the South. They produce good yields of seed that germinates fairly readily. Much remains to be learned about their carrying capacity and nutritive values.

WATER *for the Land of "Old Jules"*

By Joseph P. Collopy

ON THE MIRAGE FLATS project near Hay Springs, Nebr., streamlined land development is going on in a big way. In this dryland-farmed area, made famous by the historic novel "Old Jules," the Soil Conservation Service has an assembly-line style of farm irrigation development.

Upon completion of the project, this valley will be one of the most productive areas in the state. Irrigation is being brought to this fertile and gently sloping stock-raising area in a short span of 18 months. To do this required planning plus manpower. The planning has been done, and construction and other work is under way.

Mirage Flats represents a somewhat new type of irrigation development. Heretofore, emphasis has been placed on the larger areas. On Mirage Flats, the Bureau of Reclamation and the Soil Conservation Service are partners in developing a comparatively small area for irrigation. Yet the small acreage should not minimize its importance.

The Soil Conservation Service came into the picture when administration of the Case-Wheeler program was transferred to the Soil Conservation Service in July 1945. The Mirage Flats project was already under way. The Soil Conservation Service will cooperate with new settlers in providing technical assistance to guide them in matters of good farm practices, soil and water conservation, crop rotations, building soil fertility, and other phases of efficient land use. First undertaken, was the making of topographical and soils survey maps. The topographical map afforded complete data on slope land, surface drainage, and related facts. The soils survey map provided information on such things as types of soils and extent of erosion. From these maps the general plan was developed, including the lay-out and size of farm laterals, the necessary systems for surface and deep drains, and roadways. Each farm is regarded as a unit, and the project is being developed on that basis.

When the Mirage Flats project was approved under the Case-Wheeler Act, many of the land-

owners chose to sell their land to the government for development. Of the 12,000 acres which will be irrigated, 500 remain in private ownership. There will be some 120 irrigated farms. The settling of farmers on the land will be the responsibility of the Soil Conservation Service. With this percentage of the land development under federal control, engineers and farm management technicians had an opportunity to lay out economic size units according to topographic and soils conditions. The boundaries of the farms are determined by the main laterals, drains, watersheds, etc. In this way the farms are not divided by drainage ditches, nor cut up by large laterals. No small areas are cut off by laterals supplying adjoining farms, and no portions are bordering adjacent units to be left dry and infested with weeds because they must be irrigated with ditches through the neighbor's field. This is a contrast to the practice of using legal subdivision lines of the general land office surveys.

The arrangement of farms and roads will have quite a different appearance when this type of subdivision is finished. The farm boundaries will follow the layout of the irrigation and drainage pattern. They will be a contrast to the usual layout of farms in the general land office survey plan pattern.

One of the first operations was leveling. This was necessary because the natural land surface was slightly undulating. In that condition, the land would have been uneconomical to irrigate. In making plans to do this leveling job, the topographical map was used to determine where to place fills and make cuts. The soils survey map indicated the depth of soil profile and underlying materials so that the leveling process could for the most part avoid heavy cuts where there might be small areas of shallow to moderately deep soils. Then the field laterals were charted and the unit divided into fields. After the farm-supply laterals were located and the surface drains made, such structures as drops, checks, and turn-outs were put in place.

In October 1944, the contract was let for leveling and for the construction of farm laterals

NOTE.—The author is project engineer, Mirage Flats Case-Wheeler project, Soil Conservation Service, Hay Springs, Nebr.

and irrigation structures. Most of the land has been leveled, and the farm ditches and concrete irrigation structures will all be in place and ready for irrigation water this year.

About 8 miles north of Hemingford, the Bureau of Reclamation is completing an earth-filled dam across the Niobrara River. The dam will impound 35,000 acre-feet of water. The stored water is carried in the existing river channel to a point 7 or 8 miles below the dam where it is diverted into the irrigation system. The main canal has a 16-foot bottom and a capacity of 220 second feet, and extends 11 miles toward the project, before the main laterals begin. The siphons, checks, turn-outs, and bridges built in connection with the main

canal and laterals are of reinforced concrete and of the latest design.

On the Mirage Flats project all this planning and engineering is now bearing fruit. The large storage dam is 90 percent complete. The diversion dam is already finished. The main canal is nearly ready. Heavy draglines and large scrapers powered by diesel engines are bringing the construction of the main laterals to completion. Nine thousand acres of land which a few months ago stood as ordinary undulating dry farmland, is now carefully planned and leveled for easy and economic watering. Soon all this work will be paying off in increased production and stabilized resources.

Should This Land Be in Timber?



By Albert Arnst and William W. Hill

A NEW use for utilitarian conservation surveys as a basis for establishing land use capability classes is developing in the Douglas-fir region of the Pacific Northwest.

There is no correlation between timber-site classes and the Service's land capability classes. For example, timber site I rating could be given to a soil that occurs in two or more of our land-capability classes. A study to determine if there

Well-stocked, even-aged stands of Douglas-fir can be appraised for site quality by measuring average ages and heights of dominant and co-dominant trees. A soils profile determination, correlated with timber site quality, will provide site quality values quickly and accurately.

is any correlation between utilitarian soil grouping and timber site classes was initiated in May 1944 in the Lewis County (Wash.) Soil Conservation District. The timber-site-class information gives us an added factor for use in setting up land capability classes. Now, timber site class is taken into consideration as well as susceptibility to erosion, physical limitations in use, and management requirements.

NOTE.—The authors are forestry specialist, Sedro Woolley, Wash., and soil conservation surveys supervisor, Portland, Oreg., respectively, both with the Soil Conservation Service.



Immature stands sometimes are difficult to measure accurately for site quality. On some soils the trees may attain height exceptionally fast in the earlier years but be slowed down because of "root cramping" later on. A soils profile determination helps to indicate the real site quality.

With the utilitarian survey, correlated with timber site classes, Service technicians now can give landowners a close estimate of the productive capacity of a particular tract for timber. Also, using the survey, they can give a farmer an idea of whether that tract would produce more in timber than it would in pasture or other farm uses.

The new yardstick of timber-production removes much of the guesswork in deciding on the timber productive capacity of land. The new system works in logged-over areas, where other methods leave estimates of the probable timber yield to speculation. In forest regions this determination is needed by conservationists assisting farmers and timber owners in planning best land use.

The utilitarian soil-conservation survey, basic in prescribing land-use adjustments, now is doubly useful. Correlated with timber-site classes, it in-

dicates the timber productivity as well as use limitation of lands. To date, the only reliable measurements of timber productivity have been the timber-site classes developed and used by foresters.

The timber-site classes represent a measure of potential timber productive capacity of land. This rating of tree growth is an aid in determining whether or not the land would return a profit from timber. For example, where Douglas-fir grows fastest (190 feet or more in height in 100 years), it is placed in site class I. Where it can barely keep alive, the site class assigned to the stand is class V.

Foresters ordinarily determine site class by measuring the average height and average age of the tallest 10 percent of the trees in a uniformly stocked stand. This takes time, and special instru-



Should the farmer clear this land for agriculture or try to reestablish Douglas-fir? There are no living trees to measure for rate of timber production, but the conservation surveyor can now give the facts on which the farmer can base his decision.

ments. By this method timber-site classes cannot be set up for lands where trees are not present. We therefore sought a reliable yardstick which would accurately forecast timber yields per acre of land, in the absence of trees. Such a guide had to be easily understood and applied because workers without forestry training would be its principal users.

We knew that the degree and direction of slope, the altitude, the rainfall and the kinds of soils affect the rate of timber growth. But we also were aware of the difficulty of measuring the effect of rainfall or altitude. Nevertheless, we felt that soils largely govern timber growth just as they do the growth of other crops.

About 180 samples were taken from Douglas-fir stands ranging in age from 25 to 150 years. Most of the samples were from the 40- to 60-year bracket. In these 5- to 50-acre plots, we obtained the average height and average age of trees wherever a change in soils, slope or exposure occurred. We also examined the land on which the trees were growing and tabulated soil and other pertinent information.

Climatic factors, such as rainfall, temperature and altitude, were made constants by zoning areas having similar conditions. Woodland samples for lands of similar soils then were classified by site

index values, averages determined, and statistical studies made. In this way, an average site index value was obtained for each utilitarian group into which the soils of the area were classified.

We know the functional role of soil in crop production is determined by moisture relationships, nutrient level and soil profile. Understanding of soil texture, profile and effective depth enables us to judge how much water a soil can hold and how available to trees it will be. The amount of water a Douglas-fir can obtain determines largely whether it will yield 150 or 850 board feet of lumber when it is 60 years old.

The new information gives to the farm planner a means of estimating the long-time timber-producing value of each acre. For field use, a set of forestry tables was adapted. The tables express the total costs per acre for raising Douglas-fir on the five recognized timber sites at any given age. They also express yields which can be harvested at various ages. Also they give the information needed for determining whether the best long-time use of a piece of land is timber, or pasture or cultivated crops.

Land-clearing programs can now be worked out logically. Farmers clearing land can use this information as a guide. For example, they may wish

(Continued on page 239)

LESPEDEZA CENTENNIAL

By Paul Tabor

DURING the past hundred years annual lespedeza has advanced from a harmless weed to an important crop. The first record of its occurrence in this country is a small part of a plant sent to Harvard University from Monticello, Ga., in 1846. Annual lespedeza was found at other places in Georgia and South Carolina during the 1850's, but apparently was not widespread until the last years of the civil war.

In the summer of 1867, annual lespedeza was introduced to the public by the Augusta Agricultural Club. One writer reported in 1868, "Since its introduction, the newspapers have teemed with notices of its good qualities." Some appreciated its soil conserving possibilities. Comments from two South Carolina farmers in 1868—

"It renovates old land when turned under. It is admirable for preserving lands from washing."

"It grows on hill and valley; the bottoms of gullies are filled so densely that they can't wash any more."

The enthusiasm for annual lespedeza declined after 1868, possibly because of a combination of droughts in spring and summer, lowered phosphate supplies in the soils, and increased emphasis on cotton production through use of the newly introduced commercial fertilizers.

Annual lespedeza became a crop about 1880. Capt. J. B. McGehee of Laurel Hill, La., was a leader in its domestication. He founded the lespedeza seed industry. Its use as a crop increased slowly for the next 40 years.

The securing of better varieties for hill soils rapidly increased the acreage of annual lespedeza during the 1920's and early 30's. A tall, late common lespedeza, Tenn. 76, was selected at the Tennessee Experiment Station prior to 1919, and seed of both Kobe and Korean lespedezas were brought from eastern Asia in 1919. These new kinds were tested widely under the leadership of the late Dr. A. J. Pieters, of the United States Department of Agriculture.

A further stimulus for increased use of annual lespedeza came with the establishment of the Soil Conservation Service during the mid '30's. Now annual lespedeza is an important crop in the mid-south where it was discovered 100 years ago and

NOTE.—The author is assistant chief, regional nursery division, Soil Conservation Service, Spartanburg, S. C.

almost domesticated 80 years ago. It is more important north of this area and is increasing in importance south of it. Experience has confirmed its value for soil conservation when used judiciously. If the first hundred years are the hardest, it should be even more valuable during the coming century.

GRASS PLANTING 2,660 YEARS AGO

By Philip F. Allan

NO one knows how far back man's efforts go in the establishment of good pastures. It is certain that pasturage has been an important land use since the first domestication of grazing animals—perhaps some 8,000 years ago. Agricultural historians may not have noted the following ancient record, which, by good fortune, may be accurately dated. It was customary for kings of old Assyria to recount their exploits to their gods somewhat in the manner of a letter. Thus, the king, Sargon, told the god, Assur, of the events of his eighth campaign. A part of this account¹ is quoted below:

The city of Aniashtania, the home of his [Ursa's] herds, situated on the border of Sangibute, between the cities of Ushkaia and Tarmakisa, together with 17 cities of its neighborhood, I destroyed, I leveled to the ground; the large timbers of their roofs I set on fire, their crops [and] their stubble I burned, their filled-up granaries I opened and let my army devour the unmeasured grain. Like swarming locusts I turned the beasts of my camps into its meadows, and they tore up the vegetation on which it [the city] depended, they devastated its plain. . . . His pleasant fields, which were spread out [lit., lay] like a platter painted lapis lazuli [blue]—the surrounding plain planted to grass and *habburu*, with the chariots and horses of my destructive (?) advance, like Adad I overwhelmed and made the meadows, the support of his horses, like plowland.

Sargon's letter was inscribed in 714 B. C. The land he devastated was Armenia.

¹ From: *Ancient Records of Assyria and Babylonia*. Daniel D. Luckenbill. Vol. II. Univ. of Chicago Press. 504 pp. 1927.

NOTE.—The author is regional biologist, Soil Conservation Service, Fort Worth, Tex.



W. E. Rice lands on Perry's public square to conduct soil conservation panel.

Farmers On The Wing

By Clarence Paden

Manager, Chamber of Commerce, Perry, Okla.

OKLAHOMA, famous for its organization of Flying Farmers, may soon be transporting its soil conservation district supervisors to meetings by plane.

W. E. Rice, supervisor of the Noble County Soil Conservation District, was picked up at his farm by Pilot C. S. Vanderveer and flown to a recent district-sponsored meeting and landed—of all places—on one of Perry's streets on the public square. Rice was chairman of the occasion. On the trip also was Henry Machetta, engineering aide of the Soil Conservation Service.

Rice, former judge, practices what he preaches as far as soil conservation is concerned. He is introducing recommended soil-saving and soil-building measures on his farm near Red Rock.

"The impelling motive that brought me back to the farm is the land problem," he declared.

The occasion was Noble County's first big soil-conservation panel marking the close of the first year of actual operation of the county's soil conservation district. The day's program was sponsored by the district, assisted by the Perry Chamber of Commerce and various agricultural agencies. Response was gratifying, the session being forced to move from the district courtroom to a nearby theater to accommodate the 300 in attendance.

Participating were Leon J. McDonald, assistant State conservationist, Soil Conservation Service; Wesley Chaffin, extension agronomist, Oklahoma Agricultural and Mechanical College; Walter Marlin, secretary, State school land commission; Truman Cunningham, State office, Agricultural Adjustment Agency; Harry Elwell, assistant project supervisor, Red Plains Conservation Experiment Station, and others. Three cooperators told of their success with coordinated soil conservation programs. Four free airplane rides were awarded farmers in each section of the county to allow them to see their farms from the air. A display of farm equipment and machinery used in soil conservation attracted many. Charts were shown in the courthouse lobby.

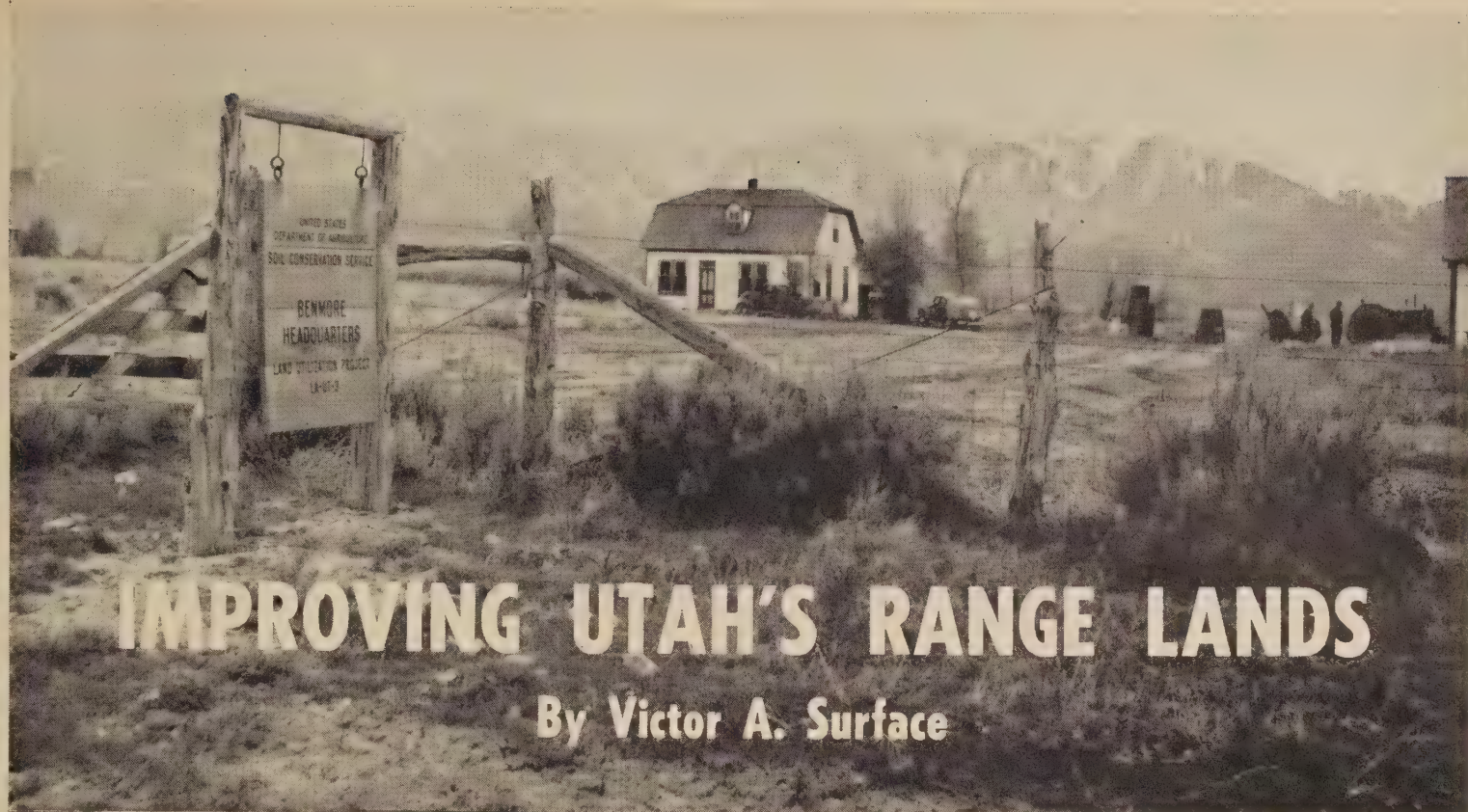
Noble County farmers and businessmen in attendance voted to make the panel an annual affair. Ivan Dilley, work unit conservationist, reported that 75 farmers have signed as cooperators. It is interesting to note that approximately 85 percent of these cooperators already have established one or more soil conservation practices on their farms. Some of the cooperators even have completed the program with the exception of one or two minor measures.



Here they unload: Henry Machetta, Supervisor Rice, Pilot C. S. Vanderveer.

Soil Conservation Magazine is suggested reading for members of soil conservation districts and for all who are interested in the techniques and progress of the soil conservation movement.

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Headquarters of the Benmore Land Utilization Project near Vernon, Utah. From here was directed the rehabilitation of 147,000 acres of worn-out land.

ONE-hundred forty-seven thousand acres of worn-out, depleted range land in central Utah have been rehabilitated and put into profitable use since 1940. The story of this recovery, and the methods used to bring it about, could well serve as a guide to range land owners all over the West. It shows how similar lands can be returned to the production of the flourishing grasses that delighted early settlers.

The Central Utah Land Utilization Project, started by the Resettlement Administration during the middle 30's and administered since 1940 by the Soil Conservation Service, was designed to return depleted range and submarginal crop lands to profitable use and to demonstrate to Utah ranchers methods of keeping such lands in top producing condition. Today the project yields more feed per acre than any of the lands adjoining. Local ranchers who graze their cattle on the area have some startling facts to tell about the results achieved.

In the early 30's Congress authorized the purchase of lands throughout the United States where it was imperative that serious erosion and water

wastage be checked. In many instances it was evident that continued use under the existing system of agriculture would result in ultimate disaster. In Tooele and Juab Counties, private landowners homesteaded vast areas to develop dry land farms, but climatic conditions prevented successful operations. Consequently, much of this land was abandoned and a large percentage of it reverted to the counties for delinquent taxes.

When conservation activities were initiated by the government the native vegetation had been badly depleted through over-grazing and the remaining plants were not able to protect the land from wind and water erosion.

First step taken by the government was to control grazing on the project to give the vegetation an opportunity to regain its vigor. Under agreement with the Soil Conservation Service, grazing permits to implement this policy were issued by the U. S. Grazing Service.

But badly misused land can't recover its former health without considerable encouragement. It was necessary to reseed on a large scale. Hundreds of acres were planted by means of various methods. Some were plowed, and then planted in the fall after the seedbed had settled. Some were planted on the contour with a lister-seeder which

NOTE.—The author is head of the education section, Soil Conservation Service, Albuquerque, N. Mex., and was formerly District Conservationist at Tooele, Utah.

left furrows to hold the rainfall. Some were drilled directly into the Russian thistle.

Three thousand two hundred acres of land several miles south of the Vernon community in southern Tooele County had been set aside for experimental purposes. This area is known as the Benmore pastures, the name being a combination of the names of two early settlers, the Ben-nions and the Skidmores. In the old dry-farming days a town had thrived there.

The Benmore area was fenced into 28 100-acre experimental grazing pastures, one 240-acre holding pasture, and one 160-acre unit of test reseeding plots where the Intermountain Forest and Range Experiment Station of the U. S. Forest Service, the Bureau of Plant Industry, and the Utah Agricultural Experiment Station carry on tests of different varieties and species of range forage plants, depths, methods, and times of seeding range forage plants, in cooperation with the Soil Conservation Service.

On the experimental grazing pastures a mixture containing crested, western, and slender wheat-grasses, smooth brome-grass, tall meadow oatgrass, and bulbous bluegrass was planted. The seedbeds had been prepared by disc plowing. Half the pastures were originally seeded in 1938 and the remainder in 1939.

Surprisingly, the crested wheatgrass was the only species which made an impressive growth. A native of the steppes of Siberia, this grass made a vigorous stand at Benmore. Each of the other grasses grew to a small extent, but all of them were dwarfed by the crested wheatgrass.

It was necessary to give these reseeded areas protection from grazing until the fall of 1941. By that time crested wheatgrass had crowded out most of the invading cheatgrass and Russian thistle in 12 of the pastures. Cattle were allowed to graze a total of 542 cow-months in the fall of 1941. The following fall, 636 cow-months of grazing were permitted and 173 acres were harvested for seed.

By the fall of 1943, all of the pastures could be grazed. In addition to 258 cow-months of summer grazing, 1,522 cow-months of fall grazing were allowed in 1943. Also, 16,000 pounds of seed were obtained from 231 acres of the pasture areas.

For two months in the spring of 1944, 225 cattle grazed the pastures. Cows without calves showed an average gain of 2.33 pounds per day. Cows with nursing calves gained 1.33 pounds a day, and

their calves gained 1.75 pounds per day. Cows which calved in the pastures after they had been weighed in, gained 0.75 pound per day and their calves gained 2 pounds per day. The average daily gain of all classes of cows grazing outside the project on depleted native range land was approximately 1.3 pounds.

Four cows and calves owned by Sidney Pehrson made average daily gains of 2 pounds per head. Four dry cows owned by Alma Nieldsen made gains of 3 pounds, 3.1, 3.4, and 3.7, respectively. Heifers owned by D. J. Frederickson and Ed Anderson made similar gains.

Results like these have caused a considerable change on the land that surrounds the land utilization project. Ranchers who benefited by the reseeding operations have decided to apply the same practices on their own lands. Special equipment has been developed for an extensive reseeding program on private lands, and all the lessons learned by the Soil Conservation Service in preparing the land for reseeding are being used by the Vernon Soil Conservation District ranchers in improving their lands.

For example, it became apparent that considerable attention should be paid to the preparation of a seedbed. Plants such as sagebrush or cheatgrass offer considerable competition to the young grass seedlings and frequently need to be elimi-



Crested wheatgrass grows knee high. One acre carries as many cattle as 7 acres of sagebrush. Interested here in the results of range reseeding are Gerald Geraldson, H. K. Woodward, J. A. Libby and H. D. Kronk.



This one-way disc plow is removing sagebrush on lands near Vernon, Utah. Crested wheatgrass will take its place, increasing the grazing capacity of the range.

nated before plantings are made. This enables covering the seed to the right depth and gives the seedlings a chance to establish themselves against plants which naturally compete with the perennial grass for moisture. The ranchers also learned the importance of other range management practices such as deferred and rotation grazing, proper stock water distribution and salting. They are also raising the quality of their beef cattle through improved sires and careful culling of cows. They are regulating cattle breeding so as to market more uniform calves.

The production of grass seed proved to be an important by-product of the reseeding operations. Yields ranging from 85 to 300 pounds per acre have been obtained. During 1944, approximately 17,000 pounds of crested wheatgrass seed was harvested on a small portion of the experimental area. This fall almost 2,000 pounds of grass seed were produced from the pastures, notwithstanding the increased grazing load carried during the spring months of 1945.

Last spring the grazing load on the experimental area was raised to 425 cattle. These cattle were taken from an overgrazed area outside the project and were not put on the National Forest lands until July 5, a full six weeks after they are customarily allowed on the forest. Examinations made of the summer range last June show that native plants are regaining their vigor as a result of the relief afforded by the crested wheatgrass.

These factors in the success of the land utilization project are immediately apparent, but its ultimate effect on the livestock economy of the state will be further enhanced as continued safe

land use practices, demonstrated on this once useless area, are applied by keepers of the surrounding lands—men who will doubtless observe the benefits, increased profits, and security involved in the application and improvement of the same conservation practices.

Should This Land Be in Timber?

(Continued from page 234)

to leave their site I land that is producing timber at a high rate to the last of their clearing, or they may wish to keep it in timber. Site III or IV land may produce the highest grass or grain yields. From the tables, clearing costs also may be estimated. The soils-timber site data in Lewis County provides a usable guide for selecting favorable tree-planting sites.

Some soils, excellent for Douglas-fir, are relatively poor for cultivated crops, because Douglas-fir growth needs are different from those of cereals or grass.

Correlations between timber site classes and soils groups could be worked out for other timber types and for other areas; all that's needed is a reliable set of site index values for the species concerned. Once the correlation has been obtained, the district conservation survey, prepared on a utilitarian basis, can be used as an accurate expression of timber productivity and as an added tool in land-use planning. Land capability classes complete the picture by highlighting the management requirements consistent with soil and water conservation needs and best long-time use.

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Front Cover: Home gardens profit from soil conservation measures. Cultivation across the slope, mulching, and other standard erosion-control practices are being ever more widely adopted for growing vegetables, berries, and other crops for the home table. The photograph introducing this issue was made by George Pace. The smiling young lady is Miss Betty Sue Medlin of RFD 4, Milan, Tenn.

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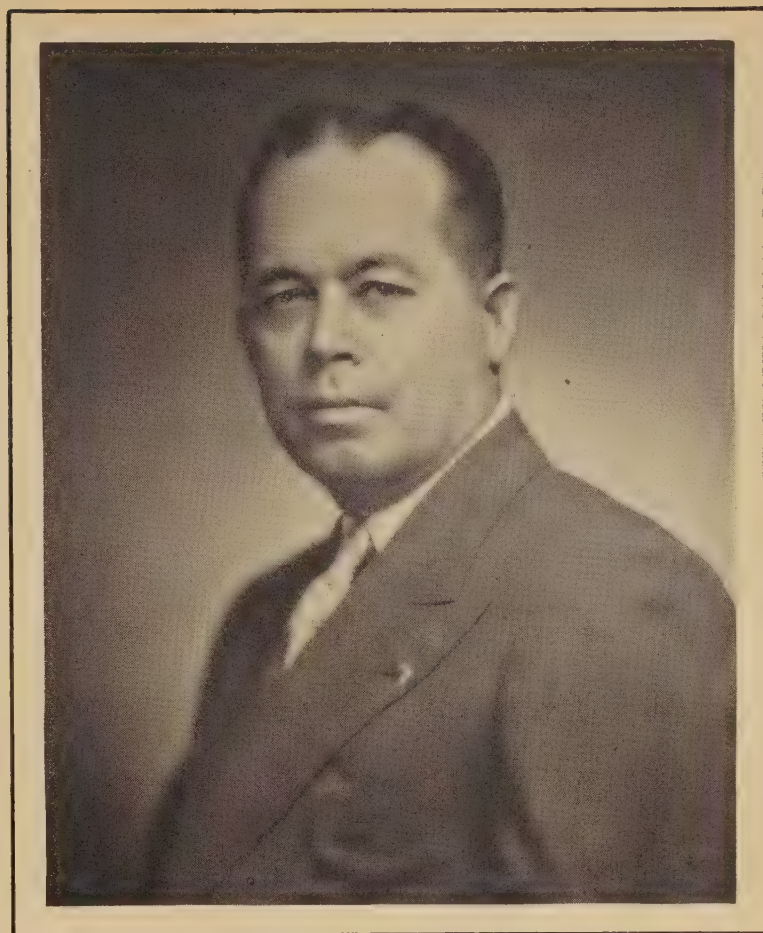
South Starts on Long Road Back

**By the Honorable Sam H. Jones
former Governor of Louisiana**

THROUGH the conservation of soil, water and forest, the South is returning to agricultural and economic stability and prosperity. The road back will be long and slow. But the start has been made, and with everyone contributing his needed help, restoration of the South to its once traditional place of agricultural, financial, and cultural eminence is assured.

Among the many things I learned as governor of Louisiana was this fundamental: that country is rich whose people do the most with its land, its water, and its forests. All else depends on that.

Despite our obvious dependence on the land for our very existence, this Nation as a whole is seeing its soil material washed and blown away through erosion at the rate of 3 billion dollars a year. At least 500 million dollars in soil is being washed from the States of the South into the Gulf of Mexico each year. Never in the history of any country in the world has erosion been so swift and destructive as in the United States. We are headed for disaster and poverty unless we stop this wanton waste. We shall go the way of all great civilizations if our present course is not changed and changed soon. Until very recently, our course was one of economic suicide. Remember that the loss



The Honorable Sam H. Jones.

of agricultural land in one way or another preceded the decline and fall of each civilization the world has known.

This actual situation makes soil erosion one of the most serious of America's problems. Some responsible people have gone so far as to call it the most serious problem of them all. It all sounds at first like a prophesy of certain doom. Those who have studied the problem, however, know that land can be saved if we start in time. It requires work and determination. The Soil Conservation Service lists a total of 59 standard conservation practices for the job. These practices are interlocking safeguards, one supporting another. All are seldom used at one time. Various combinations are fitted together to suit the needs and adaptabilities of particular lands. This is what is known as a coordinated program of soil protection. All of the various conservation practices are based on the principle that we must cooperate with nature. If we oppose nature, we shall lose the fight.

We in Louisiana are richly blessed if we would but take advantage of our natural resources and our opportunities.

Our land is abundant in farm requirements. Our farms comprise 9 million acres of land poten-



(Above)

This eroded land in Louisiana's West Feliciana Parish was too steep for safe production of tilled crops. It was taken out of cultivation and seeded to a mixture of clovers, Dallis grass, and Bermuda grass.

The same field after having been treated with lime and commercial fertilizer, and seeded to clover and grasses. The vegetative cover resulting not only holds the soil against washing but also adds weight to beef cattle and increases milk production of dairy herds.

(Below)



tially as productive as any on the face of the earth. Yet less than half of this particular land is in cultivation and, before the war, Louisiana farmers averaged but \$186 a year in cash.

We have the most ample rainfall and the most extensive waterways of any State in the Union. Yet we let our streams become clogged with shallows and shoals that block navigation. We let water remain on our rich farm acres, where it damages crops every year to the extent of 25 million dollars. Our failure to practice proper soil conservation deprives us of a farm income five



No help to the community is this chewed-up slope. But there are ways to mend such land, even make it profitable. Tree-planting, for instance.

times that of 1940. While the Federal Government wisely spends millions of dollars to irrigate western desert lands, we do nothing in asking aid for removing excess water from the five million-odd Louisiana acres that need drainage badly and, if drained, would be exceptionally fertile and productive.

Unplanned and unwise exploitation of our resources in the past led relentlessly to the depletion and impoverishment from which we are now beginning to emerge through the adoption of conservation practices.

We had an immense acreage of forest lands, of virgin pine and hardwood. We let outside exploiters have this wealth for a song. We sat idly by and saw some of the Nation's finest forests cut to the ground, with no thought of the waste or the



Average age of these trees is 30 years. This fine woodland belongs to S. W. Taylor, a district cooperator near Farmerville, in Union Parish. Selective cutting has just been completed with the aid of technicians of the Soil Conservation Service. Some logs were removed first, followed by pulpwood operations.



These pine trees were planted on a badly eroded hillside in 1940, with the help of the Soil Conservation Service.

depletion that was bound to follow when the rains, finally unchecked, tore through the earth and washed away the soil. We saw our lands ruthlessly stripped, our future cut out from under us.

Eventually we saw crumbling, rotting ghost towns which once thrived on prosperity. With destruction of our forests went jobs and income for our people. Came the breadlines, the doles, and the makeshift jobs.

Thus have we ignored the richness of our soil, disregarded our highly valuable water supply and permitted the destruction of our forests in the most reckless manner known to mankind. It is enough to cause us to hang our heads in shame.

What has this unplanned, this thoughtless, this extravagant, this reckless, exploitation of our resources reaped for our people? In the winter of 1940-41 there were half a million persons in Louisiana too poor to provide the next meal. One out of every five persons in the State was being fed at public expense. And at least half of these came from farm lands that are potentially the most productive on earth.

Looking around me, I found our soils eroded, our forests gone, our waters drenching and ruining our crops and a fifth of our people on the verge of starvation in what should have been a land of plenty.

Short-sighted policies were being followed on our farms. Thirty percent of our farms had no milch cows, 27 percent had no hogs, 16 percent had no gardens, and 11 percent had no chickens. I found that every year we were importing 50 million dollars worth of livestock products that could be produced in Louisiana. We were importing 7 million dollars worth of poultry products that could be produced here. Our farmers were actually buying millions of dollars worth of feed that they could raise on their own farms. And they were using farming methods 25 years behind the progressive practices of the better farm sections.

I looked about me in the Southland and found that Louisiana was no exception to the rule: the entire South was following the same unplanned, short-sighted, extravagant, wasteful policies, policies that were relentlessly leading our people to illiteracy, malnutrition, poverty, and desperation.

No less than 21½ million homes were classed as substandard and unfit for human habitation in a civilized country. I found the most eroded soils in the Nation, the greatest illiteracy, the poorest housing, and the most disgraceful health record.

I found the poorest farming. The average income of the South's people as a whole was \$25.50 per capita a month, the cash income of our owner

farmers, \$15.50 a month, of our tenant farmers, \$6.25 a month.

I found a woeful failure to look at the fundamentals involved—the fundamentals of soil and water and forests. No thought was being given to the building of wealth-producing farms, despite the fact that farmers constitute the largest part of our population in Louisiana. The prosperity of the State depends directly on the welfare and prosperity of our farm people.

Yes, the Southland was depleted and discouraged. Not always had it been that way. Once, not so long ago, it was the richest portion of the Nation. It once had 49 percent of the Nation's wealth whereas today it has but 10 percent. Louisiana was once the richest State in the Union. Its people had incomes 72 percent greater than those of New York State; today they have about half the national average. The port of New Orleans once handled more cargo than the entire British Empire; today it handles about 12 percent as much as the port of New York. Louisiana was once the banking capital of America; today it cannot boast of even a Federal Reserve bank. Seven-eighths of America's millionaires once made their fortunes from Louisiana's farm lands; today the total annual per farm income, in cash and home-consumed commodities, scarcely exceeds \$500.

Yes, the Lord bestowed His bountiful blessings upon us. He gave us rich soil, ample rainfall, and millions of acres of beautiful forests abundant with wealth. But I am afraid that we have been like the servant who took the talent from the Lord and hid it in the earth. We have not conserved our resources to produce more and continuing wealth; rather we have been destroying the resources which produce our wealth.

Our mission should be to point a new way; to convince our people that there is a way to help the poor and the destitute without resorting to the dole and the poor house; to build new hope in the hearts of the underprivileged, new ambition where ambition has vanished; to point out vast remaining wealth on which to build; to clear a pathway over which our people can once again advance to a prosperous life; to help people help themselves; to bring back equality of opportunity.

To help attain this goal, we should plan to put into cultivation at least an additional 4 million rich acres and thus take care of 25,000 additional farmers on a profitable standard. We should remind our people that a forest industry now yield-

ing 125 million dollars a year could be doubled and provide jobs for 20,000 more persons. We should remind them of the new discoveries that expand the markets for our forest products. We should give them a picture of the tung oil industry and what it can mean to this Gulf coast area.

We should plan the drainage of our rich farm lands that have an excess of water, thus averting crop damage of 25 million dollars annually while multiplying by five our total farm income.

True, progress is slow. But more people are beginning to think about these things. Today we have our economic development committees which view the future with a broad agricultural, industrial, financial, and even cultural perspective. Today more people are talking about better farming, finer livestock, conservation of our soil and other resources, building greater waterways, and providing greater drainage programs. We have begun to look around for those whose job it is to conserve our forests and other resources, to save our soil and thus build a richer agriculture, to provide a livestock industry and to bring health, happiness, and prosperity to our people.

We are getting down to fundamentals. We are getting back to the soil—to the soil which has meant and can again mean so much in material prosperity to our people. Action at last is following years of preaching about the right kind of farming, the balanced kind, the diversified kind that provides sustenance whether or not one money crop happens to fail.

We have called upon science and research to help us with the job. We are quitting ruinous practices and are beginning to conserve our soil. We are departing from primitive methods and beginning to substitute modern, tested practices and to use efficient, money-saving mechanical equipment. More and more we are turning to industrial and agricultural research to help us solve our farm problems and give our farm families higher incomes, greater purchasing power and better living standards which elevate the economic welfare of the entire community, State, and Nation. What affects the farm segment of our country affects the entire population. We know that everyone, farmer, banker, business man, industrialist, and just plain citizen, has a stake in the restoration of our land to a sound, lasting, and profitable basis of productivity.

We in Louisiana are tackling the problem in the field. Already we have the most complete soil

conservation set-up in the Nation. We are wiping out our deficiencies in livestock. In spite of reduced manpower, the 1944 farm income was twice that of 1940.

True, we are still spending millions of dollars out of the State for meat, dairy products, and poultry. But we have made a start and I believe we are tackling the job constructively and intelligently. To build a great livestock industry we need a pasture program. To have good pastures we need additions of lime, potash, and phosphate to our soil. Within our borders we have great supplies of lime in both stone and shell. Yet until recently we did not utilize this resource. In 1941 we had no agricultural lime plants and we placed only 10,000 tons of lime on all Louisiana farms. In 1944 we had 3 lime plants in operation and placed 300,000 tons of lime on our farms and pastures, an increase 30 times over in 3 years.

We need 3 million acres of improved pastures as against the 1 million semi-improved now in existence. Our job of pasture improvement has just begun.

It is well to remember at the beginning of our task that none of our goals can be reached without conservation of the soil itself. That means not only the control of erosion but careful planning to use our soils for the purpose they are best suited by nature. It means the efficient use of water. It means a planned rotation in order to get the largest possible yields per acre, to get crops of higher quality, and to prevent deterioration of the soil by year-after-year planting of the same soil-depleting crop.

Soil conservation embodies a complete and co-ordinated program designed to utilize every acre of the farm productively. We have dedicated ourselves to this task in the accomplishment of which the Soil Conservation Service is making an outstanding contribution.

Louisiana has approximately 29 million acres of agricultural land, of which some 25 million acres are now included in soil conservation districts authorized by State law. Twenty-two of these districts have been organized so far. In the creation of soil conservation districts our farmers are not only saving the soil and making it more productive but they are keeping alive and proving the value of democratic government. Soil conservation districts are organized and governed by the farmers themselves. Thus is the principle of local self-government perpetuated.



Louisiana has 5 million acres of productive, fertile land in need of drainage. Thousands of dollars in labor, seed, and fertilizer are drowned out each year. This 75-acre field lost two corn plantings by flooding.

It should be kept in mind that the mere placing of our entire 29 million farm acres within soil conservation districts will not in itself do the job. Under a coordinated, over-all plan of soil conservation, we must take the 9 million acres that compose our farms and do the necessary terracing, contour plowing, and strip cropping that will stop erosion. We must take our vast areas of cut-over land and stop erosion by building pastures and new forests. We must take the five million-odd acres that need drainage badly and put those acres into fruitful production. We must replenish the fertility of the soil by putting back into the earth minerals that the plant life has used. In short, we must cooperate fully with nature.

Until we do all of these things, our job of soil conservation will not be ended. As I have indicated, in Louisiana we are just beginning the huge task of restoring our soils and insuring them against future loss by erosion. A good foundation has been laid and we have a capable staff of administrators and technicians. But the big job remains to be done.

While it is comforting to know that 87 percent of the state agricultural area is embraced in soil conservation districts, the fact remains that only 9,300 farms out of the 150,000 in the State have as yet signed agreements to install coordinated soil conservation programs. We still have about 140,000 farmers to enroll. And they must be enrolled if we are to conserve our soil and build a permanently prosperous Louisiana.

Planning for lasting agricultural prosperity must include a farm balance of food, feed, and fertility crops. We must get back to the philosophy of producing a living on the farm. We must

raise food for the family and feed for our livestock. And we must plant crops which will restore the fertility we have taken from the soil. We must balance our crops with livestock in a proportion consistent with sound land use. We must not only preach but we must put into practice the doctrine that the cow, the sow, and the hen are still the keystones of agricultural prosperity. We must balance our agriculture with industrial development.

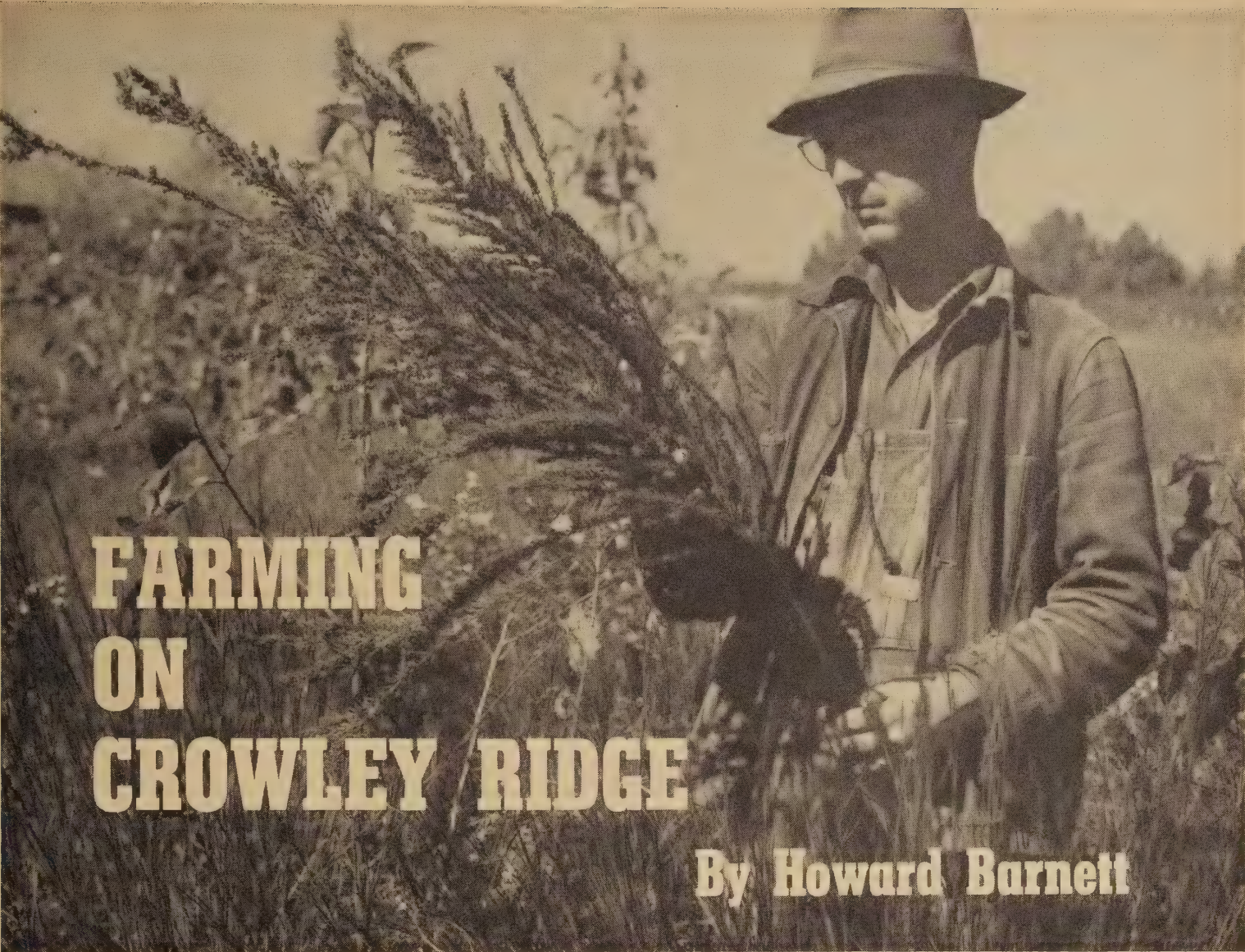


This is the same field after installation of a drainage system. This ditch takes care of excess water from 190 acres of fertile land. It was designed cooperatively by district and Soil Conservation Service.

It has been proved time and again that a coordinated conservation program not only saves the soil but increases per-acre yields and improves the quality of crops. Knowing this, I can't believe that we lack the intelligence, the vision, the wisdom, the energy, and the ability to do the things necessary to restore our agricultural productivity and prosperity.

I see a future of new forests to grow new wealth and protect our soil. I see luxuriant pastures that will sustain five times the cattle population we have today. I see scientific farming practices that will give us a diversified program and a farm income that will reach a half billion dollars a year in contrast with the 100 million dollars annual income before the war. I see a State that will solve its drainage problem and add 25,000 new farms of 160 acres each. I see the utilization of machinery and modern farm mechanization that will take away the drudgery and permit us to compete with the most prosperous farm sections of America. And I see in our farmers the pioneers who are blazing a new trail, the pathway to future prosperity and happiness, for through their initia-

(Continued on page 251)



FARMING ON CROWLEY RIDGE

By Howard Barnett

LUTHER Adamson, who farms 174 acres a few miles north of Forrest City, Ark., on Crowley Ridge, cut and sold considerable timber from a sizable hollow on his place last fall. Exactly where that hollow is located—on the same ground where he cut the trees—Adamson harvested a pretty good crop of sweet potatoes back in 1916.

There wasn't a tree in the immediate vicinity of the yams in 1916. Neither was there a hollow. The sweet potato field, at that time, was a productive piece of gently sloping land.

Adamson moved away from the place that year. He didn't come back until 1934. During the 18 years he was gone the hollow developed. The sandy, sloping soils of the sweet potato field eroded away.

"Don't suppose it ever had a terrace or a contour furrow on it," says Adamson. "I'm sure it didn't have any soil-improving crop.

"I know what happened. The field was new land

Adamson's pet gully-healer is sericea lespedeza. At one place where he seeded sericea and little bluestem an old gully has filled two feet in the last six to eight years.

when I lived here before. The soils stayed in place, fairly well until several years of crops depleted the fertility. Probably there was considerable sheet washing. Then a gully started. Nothing was done about it. That's fatal on these loess soils. It couldn't have taken long for the gully to wash out until it became this hollow. Now I could put my whole house and two or three more in there.

"The trees came in—mostly these hardwoods—and this year some of them were big enough to cut. The soil in the hollow is rich—all this loess soil we have here is just topsoil picked up somewhere in ages past and laid down here. This year's is the first production from that land for probably 25 years, except for a little firewood now and then."

Adamson doesn't want any more tree-growing hollows developing where the land is suitable for cultivation. For that reason, he's particularly careful with cotton and corn.

NOTE.—The author is district conservationist, Soil Conservation Service, Forest City, Ark.

"The way I see it," he says, "the average farmer wears his cotton land out before he rests it. Then he has trouble bringing it back to good yields."

To win in the touch-and-go battle with erosion on cropland, Adamson uses a variety of conservation practices. He is a cooperator of the South Crowley Ridge Soil Conservation District. Frequently he consults Soil Conservation Service technicians assigned to the district on the right way to solve some particular problem. One of the chief measures Adamson uses is to plant plenty of soil-improving crops. He has one pasture which has been in lespedeza and winter rye grass for seven consecutive years.

"It's ready for a crop or two of cotton now," Adamson says. "The fertility is up, but it won't be there long if I don't keep on using soil-improving crops, necessary terraces, and outlets."

Adamson's crop-rotation plan calls for cultivation 2 or 3 years and then pasture for 6 or 7 years. It pays off. Following that system, and using winter cover crops of bur clover and hairy vetch while the fields are in cultivation is part of the



Bird dog in pasture. Dallis grass and common lespedeza make good grazing for Adamson's cattle and a fine habitat for quail.



These logs have reached maturity since 1916. They came from a field that once grew sweetpotatoes.

rotation. Adamson has raised his lint cotton production from half a bale to the acre in 1934 to 505 pounds per acre now.

The cultivated crops don't draw all the benefits

of the rotation, either. Dallis grass and lespedeza for the eighth straight year on one field produced a ton of hay to the acre in 1945—well above the average for the neighborhood.

Adamson uses soy beans with his corn. "I make all the way from 20 to 60 bushels of corn per acre, depending on how good the soil is. Where corn is grown without a conservation rotation it makes 10 to 15 bushels around here."

The 174-acre farm runs 29 head of cattle, 5 head of stock, 125 chickens, and from 25 to 90 hogs annually. The pasture and feed grown on the place provide enough for the animals to eat, although Adamson supplements the cattle ration in winter with some protein, usually cottonseed meal.

Farming on Crowley Ridge, which soils men say is a formation of hills laid down by winds carrying particles of soil, calls for a continuing fight to stand off the erosion that threatens constantly.

Run-off water from Adamson's road washed out a ditch in an adjoining field. It was so large that a tractor couldn't cross it. Adamson sloped the sides of the gully and seeded sericea and little bluestem. The gully has filled in more than 2 feet in less than a dozen years and the erosion is controlled.

Adamson seeds and sods whenever he sees a gully start. He has a favorite gully preventive measure, too. It consists of leaving border strips 30 feet wide between his cultivated fields and the impinging woods or roads. "You don't make anything out of that area half the time anyway," asserts Adamson. "It's worth a lot to me to have the quail that border strips bring in. The strips grow up in native grasses and I let my cattle graze them in winter. They're good forage."

Adamson has built over 10,000 feet of terraces. All his cultivation is on the contour. He regulates grazing on his pastures, temporary or permanent, to help the grasses reach their maximum growth. Crop-residue management, liming and fertilizing where needed, and spreading barnyard manure are among other conservation measures which he follows profitably.

"I farm the conservation way, because it builds up the land. It helps me make a better living. I began bending my rows before the soil-conservation districts came along. We had done that back in Mississippi when I was a boy. But contour rows and terraces aren't enough. A lot of mud still leaves in run-off water after a rain. Not as much as when I came back here in 1934, but too much. That mud is topsoil. Conservation farming is helping me stop the washing. It's helping me have a farm that will still be producing years from now. This farm might have been gone now if I hadn't been doing things to take care of it."

LONG ROAD BACK

(Continued from page 248)



This cultivated field has been terraced so that the water empties into a sodded ditch, which also serves as a parish road ditch. Water so handled causes a minimum of erosion damage.

tive in organizing and governing soil conservation districts they are leading the Nation to a sound and permanent agricultural economy.

We have a herculean job to do. We have begun that job. To attain our goal we must have education and work and vision and money. We have our minds set to it and we will succeed. Success means the rebuilding of our worn-out farms; the development of luxuriant pastures; greater yields of old and new crops of finer quality; better beef and dairy cattle; more modern, comfortable, and attractive homes; greater income for the small farmer; a higher standard of living with more of modern conveniences to banish drudgery; greater purchasing power and hence more business for the business man and a fuller, more pleasant life for the entire community.

With this will come a healthier people; brighter looks on the faces of our farm boys and girls; better nutrition; better education; better opportunities. Better roads will be built to our farms because we'll have more money to build them. There will be better churches and better schools. Electric lines will lead to all our farms instead of merely one-fifth as at present. Labor-saving machinery will help the farmer as electrical appliances will help the farm women. There will be less drudgery and more time for the religious, civic, and cultural side of life.

It will mean a new day for Louisiana, a new day for the South. It is not merely a dream. It is a practical, time-tested plan that is based on the soundest of fundamentals—the conservation of our soil, our water and our forests.

Average size of a farm in the United States is 174 acres. But don't be fooled by measurements—it is productive capacity that counts. Soil conservation makes every acre bigger.

EARTHWORMS FIGHT EROSION, TOO BY HENRY HOPP

NOTE.—Joint credit for the studies here described goes to Homer T. Hopkins, Jr. He and Mr. Hopp are soil conservationists with the Soil Conservation Service, Beltsville, Md.

THE LOWLY earthworm's part in conserving soil is being studied by research workers of the Soil Conservation Service.

Soils experts have long known that the formation of granules helps to make the soil resistant to erosion. These granules are known technically as soil aggregates. Aggregates consist of individual soil particles cemented together into larger pellets.

The individual particles of a soil are classified as gravel, sand, silt, and clay. Gravel is made up of particles larger than approximately $\frac{1}{25}$ of an inch. Sand particles range from $\frac{1}{25}$ of an inch

down to $\frac{1}{500}$ of an inch. Silt particles measure between $\frac{1}{500}$ and $\frac{1}{12,500}$ of an inch. Particles smaller than $\frac{1}{12,500}$ of an inch classify as clay.

In an unaggregated soil the particles are separate. When exposed to the erosive action of rain and flowing water, many tiny particles are carried away and the rest are packed together. Soil in this condition becomes waterlogged with rain; crusted and hard with drought. When a soil be-



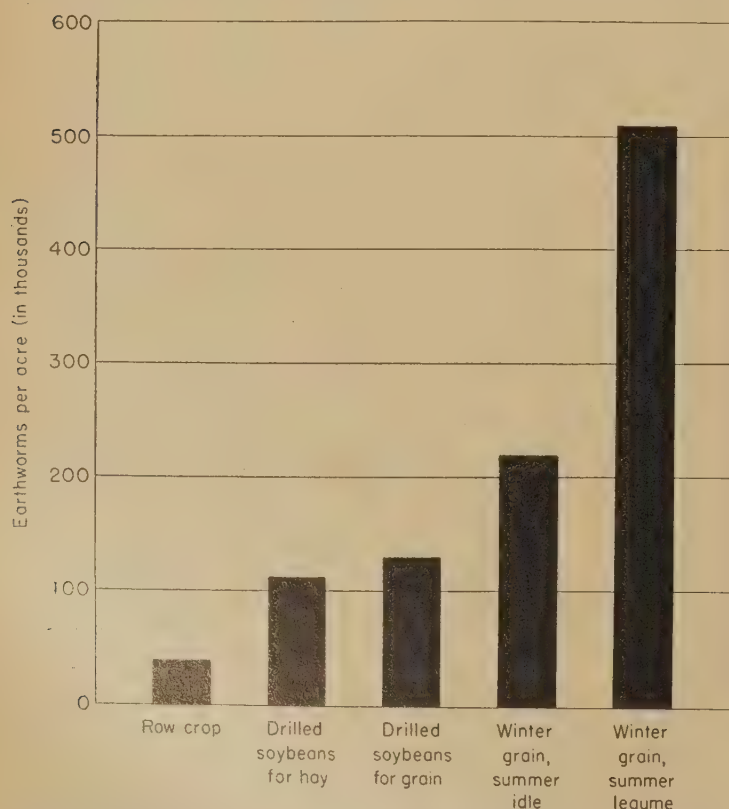
Lumbricus terrestris.

comes aggregated, the individual particles—usually the smaller ones—join together into larger compact granules. These granules may vary in size up to $\frac{1}{4}$ of an inch thick. They resist better the beating action of rain, and because they are not carried so easily by flowing water make the soil more resistant to erosion. Well aggregated soil keeps its looseness when dry or wet. Water goes in easily and the soil remains ventilated. This good balance between air and water in the soil helps plants to grow. The formation of aggregates, therefore, becomes a matter of prime importance to soil conservation.

We know that microscopic soil organisms have a part in forming aggregates. The bacteria and molds of the soil live on dead vegetation or the trash left after crops are removed. Certain of the bacteria are known to produce slimy materials capable of cementing individual particles together. Molds consist of fine threads which may serve similarly.

Now, data from the new project seem to show that earthworms are topnotch builders of aggregates.

In one test, soil from a lespedeza field was first screened. The screen had holes $\frac{1}{50}$ of an inch in diameter. This fine soil was placed in containers and water was added. One container held the soil plus whatever bacteria and molds were naturally present. The contents of the other con-

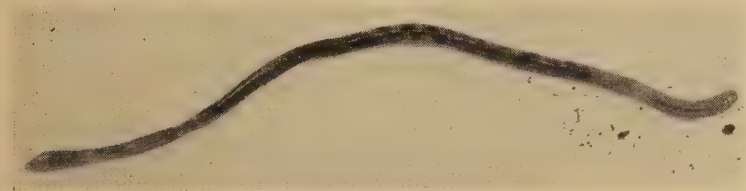


Earthworm count in February 1946, under different kinds of animal cultures.

tainer were similar except that worms were added.

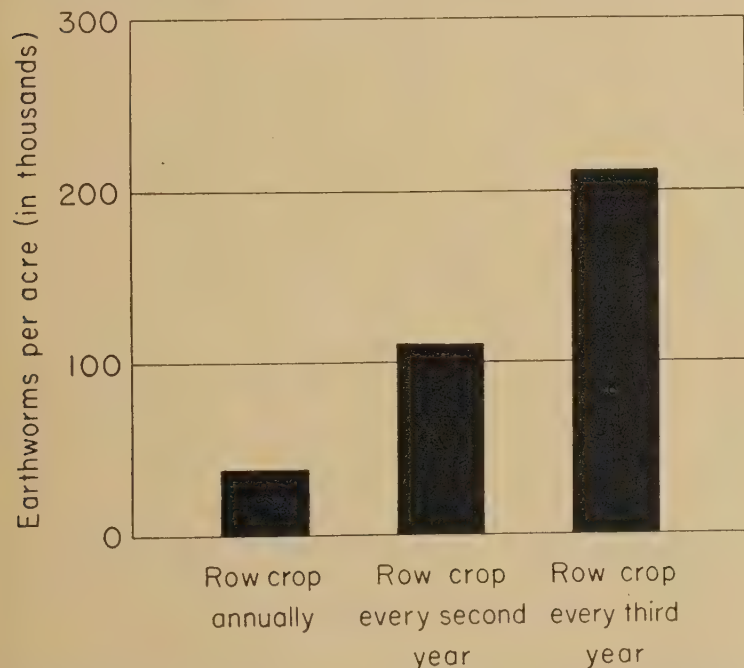
After 3 days, water-stable aggregates had been formed that would no longer pass through the screen. In the soil containing microorganisms but no worms, 5.9 percent of the soil had formed these large aggregates. In the soil containing worms, 12 percent was in large aggregates. Thus, the soil containing worms had about double the quantity of water-stable aggregates.

Not only was the *proportion* of aggregates larger with worms present, but the *durability* of these aggregates when hit by raindrops was greater. This was determined by subjecting the larger aggregates to water dropped from a height of 12 inches. The number of drops required to break the aggregates into their finer particles was counted. The aggregates formed under the action of microorganisms alone were broken apart by 6 drops, those from the worm cultures by an average of 13 drops. The worm-culture aggregates were, therefore, about twice as resistant to the erosive action of falling water.



Helodrilus caliginosus.

How do earthworms form these aggregates? Worms are unique in that they are among the few animals that eat soil. They eat the soil along with



Earthworm count in February 1946, after row cropping in 1945, in plots planted to row crops annually, every second year, and every third year.



Relative sizes of aggregates. Left to right: *Helodrilus foetidus*, *Helodrilus caliginosus*, *Lumbricus terrestris*.

organic matter. The excrement—or worm manure—is expelled as tiny pellets. These are the earthworm aggregates.

The rate at which earthworms excrete aggregates was determined in other tests. Three different kinds of earthworms were used: *Lumbricus terrestris*, which was obtained from a lespedeza field; *Helodrilus caliginosus* from a broomsedge field; and *Helodrilus foetidus* from a manure pile. They were given good moisture conditions, a fertile soil, and warm temperature. The rate of aggregate formation under these favorable conditions is shown in table 1. The *Lumbricus* worms, the largest of the three species, produced about their own weight of aggregates per day. The two other species, which were smaller, produced aggregates at a slower rate. The size and shape of the aggregates varied with the kind and size of the worms, the *Lumbricus* worms averaging largest. It looks from these studies as if earthworms are pretty good aggregate factories.



Helodrilus foetidus.

To what extent can farmers increase earthworms in the soil by simple methods? Results from rotation plots started 5 years ago at the Maryland Agricultural Experiment Station offer some light on this question. One set of counts was made on land cropped the following ways:

(a) Row cropping every year.

(b) Two-year rotation (row crop the first season, small grain and sod crop the second season).

(c) Three-year rotation (row crop the first season, small grain the second season, hay crop the third season).

The earthworms were counted during the winter on the plots that had been in row crop the previous season. About 5 times as many worms were present in the 3-year rotation plots as in those subject to annual cultivation.

TABLE 1.—Quantity and size of aggregates produced by earthworms in a culture of Christiana silt loam soil

Species of earthworm	Average weight per earthworm (grams)	Quantity of soil aggregated per worm-day (grams)	Average diameter of aggregates (mm.)
<i>Lumbricus terrestris</i>	2.10	2.2	3.3
<i>Helodrilus caliginosus</i>	1.23	.5	2.4
<i>Helodrilus foetidus</i>	.49	.3	2.0

TABLE 2.—Earthworm count in March 1946, under sericea lespedeza and broomsedge in alternate strips established in 1940

Cover	Strip number	Earthworms per acre (thousands)
Sericea.....	1	1,100
	3	825
	5	915
	7	1,010
	9	1,830
Average.....		1,136
Broomsedge.....	2	320
	4	550
	6	550
	8	640
Average.....		515

Another set of comparisons suggests that farmers may be able to keep up the worm population even with an annual cropping system. The test included:

(a) Row crops, in which the land is plowed and cultivated.

(b) Drilled soybeans, in which the land is prepared by disking and no summer cultivation is given.

(c) Drilled winter grain, in which the land is prepared in the fall, and left idle after grain harvest in the spring.

(d) Drilled winter grain, in which the land is prepared in the fall, but a summer legume is seeded into the grain or after the grain is harvested in the spring.

The results for these counts revealed that the plots in the winter grain-summer legume cropping plan contained far the most worms, about 10 times as many as in the plots planted annually to row crops. Indeed, the worms in the winter grain-summer legume plots were almost as numerous as in legume sod plots. Good conservation use of the land and increased earthworm population would seem to go together.

A third study made by the earthworm project suggests the importance of growing legumes. An old broomsedge field on the Soil Conservation Service tract of the Agricultural Research Center

at Beltsville, Md., had been partially converted to sericea lespedeza some 7 years ago. Five narrow strips, each 13 feet wide, were disked and seeded to sericea at that time, with intervening strips of the same width left in broomsedge. Earthworm counts made in early March of 1946 gave the results shown in table 2. More than 1 million earthworms per acre were found in the sericea strips, whereas, only half this number occurred in the broomsedge.

This project bids fair to add a new wrinkle to soil conservation. The studies indicate that an earthworm may produce, under good conditions, about 1 gram or thereabouts of aggregates per day. Worm populations of the size found in this study would be capable of aggregating perhaps 500 pounds or more per acre per day. So you see that the earthworm may be a real workhorse when it comes to turning out the aggregates we want for soil conservation. The earthworm project is beginning to show that you can keep this workhorse busy and still use your land.

Wanted, a Pledge

To arouse all Americans to the realization of their duty to save and use wisely this country's vanishing soils and other natural resources, *Outdoor Life* is offering \$5,000 in cash awards for a Conservation Pledge for use in schools and elsewhere. This pledge, 30 words or less, will be comparable to the Pledge of Allegiance to the Flag. First prize is \$3,000. Each pledge must be accompanied by an essay of not more than 1,000 words on "Why America's Natural Resources Must Be Conserved." The competition ends July 31.

Member of the advisory board of distinguished leaders in conservation is Dr. Hugh Bennett, chief of the Soil Conservation Service.

"Leading conservationists warn that unless we take definite, practical measures to conserve our natural resources, we're in danger of becoming a nation in need," says Raymond J. Brown, editor of the sponsoring publication. "Every citizen should be made aware of this exigency and urged to do his part toward safeguarding our country's God-given treasures. Such is the aim of this competition."



EARLY MEASUREMENTS OF RUN-OFF AND EROSION

By M. F. Miller, Dean Emeritus, College of Agriculture,
University of Missouri

The first plots laid out at the Missouri Experiment Station for preliminary trials in measuring run-off and erosion losses.

AT THE last annual meeting of Friends of the Land, in St. Louis, I was asked to tell something of the early work in measuring runoff and soil erosion losses at the Missouri Experiment Station. Since this brief talk created considerable interest, it seemed that it might be worth while to publish such a statement, largely for its historic value.

There seems to be little doubt that the first measurements of runoff and erosion losses from a field soil, under different cropping and cultural systems, were made at the Missouri station. Another early investigation by C. L. Forsling,¹ started in 1915, on two range areas in Utah, was designed to determine the influence of the intensity of grazing on runoff and erosion losses. These two investigations were inaugurated close to the same time but under quite different conditions, one dealing with cropped land and one with range land. The first report from the Missouri investigations appeared in 1923 and the first from the Utah investigations in 1931. However, before the detailed investigations at the Missouri station were inaugurated, certain preliminary trials were carried out and it is primarily with this preliminary work that this paper deals.

The first attempt to measure runoff and erosion losses at Columbia was inaugurated in 1915. A soils student, R. W. McClure, was assigned the special problem of measuring these losses from a

small area of bare soil with a grade of approximately 4 percent. The plan was exceedingly simple. A curbing of 1-inch boards surrounding this area was set in the ground, with an opening at the lower side emptying into a small catchment basin. After each rain McClure dipped out the



Dean Miller.

¹ U. S. D. A. Technical Bulletin 220 (1931).

accumulated water and soil and determined the quantity of each. While the trial was continued for only about 2 months, during the latter part of the spring semester, the results proved very interesting. It was shown that such measurements could be made without great difficulty and it was, therefore, decided to carry the plan further as soon as opportunity offered.

The year following McClure's simple preliminary trial, a graduate student, R. W. Vifquain² was assigned a thesis problem dealing with water penetration, runoff, and evaporation, along with measurements of eroded soil. In this investigation the runoff and erosion measurements comprised the major part of the plan and proved the most interesting and most fruitful of results. Mr. Vifquain was a careful worker, well suited to this sort of work. The plan which was developed revolved around the influence of surface cultivation on water penetration and on water and soil losses. The purpose was to measure not only runoff and erosion but the depth of moisture penetration resulting from each rain. It was hoped also, through the penetration study, along with a study of water losses from a free water surface and from a lysimeter, to obtain data regarding evaporation losses from the soil. This attempt proved largely abortive.

The plan, as finally evolved, provided for four parallel strips (5½ by 91 feet) running up and down a slope having a grade of approximately 4 percent. The soil was Shelby loam, although it contained slightly more silt and somewhat less organic matter than is typical for this type. Each of the four strips or plots was surrounded by a curbing of 1-inch boards sunk into the soil with about 3 inches extending above the soil surface. The lower ends of the two inside strips emptied on a galvanized iron platform leading to a concrete catchment basin in which the water and soil accumulated. The two outside strips were left open at the lower ends and were used entirely for determining the depth of moisture penetration, after rains, by sampling to a depth of 4 feet.

One strip in each set was cultivated frequently with a hoe. The other strip was uncultivated but was kept free from weeds by carefully shaving the surface with a sharp hoe whenever necessary.

After each rain the depth of the water in the catchment basins was measured and cleared of

suspended matter by the use of a flocculant. The water was then drawn off, and the soil removed, sampled, and the weight determined.

The measurements were continued through a period of 3½ months, May 1 to August 15, 1916. The results are recorded in the thesis filed by Mr. Vifquain for the A. M. degree in June 1917. They show the marked effect of cultivation, as compared with no cultivation, in causing an increase in the penetration of rainfall, as well as a marked curtailment in the amount of soil eroded. A summary of these results shows that the uncultivated soil lost through runoff, 47.9 percent of the total rainfall of 11.69 inches during the 3½ months period while the runoff from the cultivated soil was only 15.4 percent. Similarly, the soil loss from the uncultivated strip was 424.6 pounds while from the cultivated strip it was only 80.4 pounds.

These simple results are in general accord with those secured through later investigations at a number of the erosion experiment stations in the country. They are of interest as representing the first recorded field measurements of runoff and erosion and as providing a basis for the more extensive and long continued measurements at Missouri and at the erosion experiment stations.

Great credit should be given Mr. Vifquain for his careful work in this first attempt to measure water and soil losses from cropped lands. He was the pioneer worker in this important field which has been extended so greatly during the last 25 years.

The year following Mr. Vifquain's work (1917) a regular experiment station project was inaugurated, the results of which have been widely used. The installation of these plots was on the same site as that used by Mr. Vifquain. The detailed plans for this project were largely developed by F. L. Duley,³ who was in charge of the operations on the project until 1925 when he left the University of Missouri to join the staff of the Kansas State College. Great credit must be given him for his careful planning and execution of the work during this period. Following Dr. Duley's departure the details of the experimental work were taken over by H. H. Krusekopf⁴ who had charge during the latter part of this period of measurements and to whom much credit should be given.

It should be understood that the results of such

² Now director of short courses and personnel officer, Division of Agriculture, Iowa State College.

³ Now with the research division of the Soil Conservation Service, and stationed at the University of Nebraska, where some very important cooperative work is under way.

⁴ Professor of soils, University of Missouri.

measurements have their limitations, particularly when applied to ordinary field practices. They usually represent data from only a segment of a longer slope. Their principal value has been that of showing the very wide comparative differences in runoff and erosion losses from land in different crops, rotations, sods, or different types of cultivation. For instance, the Missouri data showed that the annual loss per acre of soil from uncropped, cultivated land was 41 tons, from continuous corn 19.7 tons, from continuous wheat 10.1 tons, from a 3-year crop rotation 2.7 tons, and from continuous blue-grass sod only 0.3 tons. These are spectacular differences and should convince almost anyone that cropping systems and cultural practices, as used by farmers, may exhaust or conserve the soils on sloping lands, depending on the systems followed. While the differences in runoff losses were not so spectacular as those of erosion losses, they were sufficient to show that under proper cropping and cultural systems much can be done in controlling the amount of water leaving a farm.

The results of these measurements of soil and water losses became available just at the beginning of the great upsurge of interest in soil and water conservation due largely to the efforts of Hugh Bennett, and they seem to have served a real purpose. This is an example of a simple investigation, developed somewhat accidentally, that provided much needed information at a time when important use could be made of it.

It may be of interest to those associated with soil conservation activities to know that the original plots laid out in 1917 are still under measurement. However, the plan has been completely revised and is now a study of the management of exposed subsoil as farming land. As a matter of fact, the 14 years of measurements resulted in such wide differences in the amount of soil remaining on the different plots that further measurements under the original plan seemed unwise.

The revised plan was inaugurated after the complete removal of the remainder of the original surface soil from all plots. It included systems of cropping and soil treatments which were thought best adapted to subsoil exposures. The idea was to determine what could be done in building up such lands and to measure the water and soil losses taking place.

The suggestion for this new plan came from some early work done by Dr. Duley at the same

time these Missouri measurements were under way. He carried out an experiment on small strips of land from which the surface soil had been removed, as compared with land where the surface soil was still in place. The results of this experiment, running through a number of years, indicated that liberal amounts of lime and fertilizer applied to exposed subsoil brought approximately the same yields of small grain and mixed hay as were produced on the surface soil without treatment. It seemed important, therefore, that experiments be carried out on such eroded land to determine something of the response to treatments.

Missouri has thousands of acres of land that has lost all, or at least much, of its surface soil. The problem is what, if anything, can be done with such lands to bring them into economic production. Much depends, of course, on the nature of the subsoil and the degree of erosion. The tight claypan areas, which have been subject to much leaching, undoubtedly offer less opportunity for improvement than areas with subsoils which are more open and less leached, such as those of the glacial and loessial lands. However, I am of the opinion, that much can be done to bring back to economic production very large areas of the eroded soils of Missouri and other States.

It is undoubtedly of first importance to check the country's soil erosion losses, but it is also important to determine what can be done with those soils which are already badly eroded and which have possibilities of rehabilitation. I sometimes think that we should speak less of soil conservation and more of soil improvement. While it is of course true that soil conservation is the more popular and more appealing term, which doubtless should be retained as the official designation of the over-all soil-improvement activities, it must not be forgotten that mere conservation is quite insufficient for most agricultural lands. While some soil improvement accompanies most conservation measures, the future welfare of agriculture demands the use of widespread and intensive soil-improvement practices. By far the larger part of the agricultural lands of the country show marked deterioration and most of these lands will respond economically to effective measures of soil improvement. One of the real problems is to find means of putting such soil improvement measures into use.



Check Your Pond With a Minnow Seine

By Verne E. Davison

A MINNOW seine used in July, August, or September will settle most of your arguments about fish in farm ponds with no more than a few minutes' effort.

When you request fish to stock a pond—even a new one—a minnow seine pulled through the water's edge will reveal the kinds of fish present. If there are any little bluegills or other sunfish—and there often are, when you least expect them—there will be more than 1,000 or 1,500 per acre which otherwise would be sought for stocking the pond. Many thousand hatchery fish are wasted annually by being placed in ponds already adequately stocked with either the right or wrong kinds of fish.

How do fish find their way into ponds? Most commonly they are there because people finding it hard to be patient until the fall deliveries of fish, "just put in a few but didn't know they would spawn so soon." Fish also get in ponds by natural means; floods and birds—but not "by bein' rained."

If you don't believe the little bluegills you placed in a pond last winter are spawning this summer, just use the minnow seine.

If you want to be sure your new bass have spawned so you can begin catching those of usable size, look with the minnow seine. Even though you catch no more than one or two bass of finger length you can be sure there are more than enough throughout the pond to replace all the "big ones" you can catch. Equally important, you can be certain that the bass will keep a correct balance between themselves and the bluegills.

If in May or June or July you find no fingerling bass, there is something seriously wrong and you would do well to obtain 100 bass per acre for fertilized waters or 25 to 30 per acre for unfertilized ponds. Once in balance, the bass will continue to regulate their own number and that of the bluegills, provided you keep out the water weeds.

If you think you can hurt the reproduction of bluegills by fishing them off their spawning beds at every opportunity, see for yourself with a minnow seine. You'll be surprised to find plenty of little bluegills in spite of the heaviest possible fishing of parent stock.

If you believe little fish need the protection of weeds, brush, and shallow water to escape large-mouth bass, eliminate these protective features. Then let a seining of minnows prove to your satisfaction that more than enough little ones are surviving at all times.

If the basic food supply is seriously short for the number of pounds of fish present, the minnow seine will show this, too, by revealing the pres-

NOTE.—The author is chief, regional biology division, Soil Conservation Service, Spartanburg, S. C.

ence of few or no tiny bluegills. Were the pond in good condition, bluegills would be hatching continuously through July, August, and September. A shortage may be a result of (1) too few or no bass, (2) too many 1- to 3-ounce bluegills, or (3) a low supply of food caused by failure to renew fertilization.

If you believe muddy ponds are unsuccessful because the bluegills and bass can't spawn, the minnow seine will give you a surprise. You will also find that "livestock trampling over the spawning beds" do not prevent the rearing of little fish. Silt and muddy waters are objectionable, but

spawning will continue to take place, nevertheless.

If you think bass or bluegills or any other kind of fish—alone—will be satisfactory in a pond, watch their failure to reproduce the third year when a minnow seine will prove there is no further reproduction.

Which measures to use in correction of a pond where fishing is poor usually can be determined by sampling with a minnow seine. The balances between bass and forage fish, forage fish and basic food supply, and the relative proportions of little fish to large ones become apparent in the July to September analysis of little fishes.



HE GROWS COTTON UNDER CONSERVATION

By Edgar Hodson

Benefitted by green manure and fertilizer, long staple cotton made better than a bale to the acre on the farm of W. F. Bell (right). Robert S. Whitaker, Soil Conservation Service technician, examines the fibre at close range.

NOTE.—The author is Arkansas state conservationist, Soil Conservation Service.

SPRING of the year 1908 saw young W. F. Bell working hard on his new farm 6 miles southwest of Des Arc in central Arkansas. He was determined to grow a good cotton crop on an old sedge grass field which had been cleared of timber back in slave days.

The 10-acre tract had been idle for a long time. "The sedge grass showed the fertility was low," says Bell. "I guess the former owners had cropped the field to cotton until it couldn't produce at a profit any longer. Then they let it lie idle. Don't suppose there ever was a soil-building crop on the 10 acres before I bought the place.

"I spent the spring of 1908 hauling barnyard manure to the field," Bell recalls. "I spread a lot of it before I planted my cotton. Fall came and we picked three light bales off the 10 acres. That was good, because it was the first production on the field for a long time.

"I still grow cotton on the same 10 acres. Thirty of the 38 years I've had this place the field's been in cotton. But now, instead of the third of a bale to the acre of 1908, I average better than a bale. I get better lint, too. This year my lint runs one and one-fourth inches. That extra length is worth money.

"The reason I get a bale of cotton where I once got a third of a bale, and the reason I get longer staple, is my soil-building program. I've been building up the soil more than 25 years.

"For the past several years, I've been farming in cooperation with the Des Arc Soil Conservation District. The Soil Conservation Service technicians who help the district tell me they think I've been doing a pretty good soil conservation job all along." Bell is a supervisor of the district.

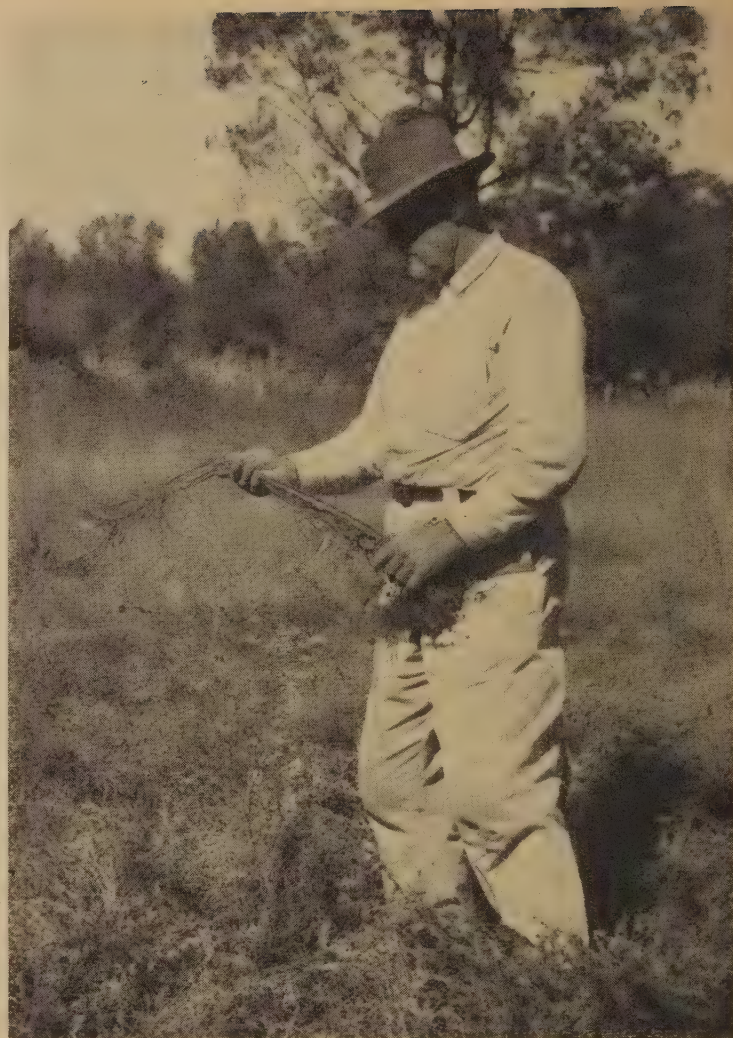
"The sod-building practices I've been following are about the same ones the technicians are recommending. They're common-sense methods. I plant hairy vetch or oats every winter, using inoculant and fertilizer as needed. The cover crop protects against erosion and provides considerable grazing for my cattle. Usually I turn my vetch under for green manure in spring. I harvest my oats, of course.

"Soil-building on the cotton field was just one part of the conservation job. Working my farm under agreement with the district is helping to get the best production in the most economical way from every acre—not just from my cotton field.

"My conservation agreement calls for growing Bermuda grass and Korean lespedeza for grazing and hay. I believe the Bermuda will build up poor land about as fast as anything you can put on it," says Bell.

The lespedeza, a volunteer, has done well for Bell.

"A fellow hardly knows what this lespedeza is



Korean lespedeza on Bell's farm. It's second growth, following a cutting of hay in midsummer. The plant Bell holds gives an indication of the amount of winter forage which will be available for his cattle.

worth," Bell states. "Plow it under and plant a crop of cotton and it'll bring it right out before you know it."

Bell says that in using a lespedeza-oats rotation on part of his land he finds the oats pay farming expenses and the lespedeza profits are clear money. This year on a 10-acre field Bell harvested 480 bushels of oats and then followed up on the same field with 13 tons of lespedeza hay. Before he started building soil on that field, Bell says he would have considered a 140-bushel oat crop exceptional.

Some of Bell's 506 acres need drainage. He and Nelson Crum, Soil Conservation Service technician, have been planning a ditch system to carry off the excess water which is keeping some portions of the place from producing at capacity.

Bell has built a farm pond in following his agreement with the Des Arc Soil Conservation District. Stocked with fish, he expects the pond to begin providing pan-size bass before long.

Conservation farming is helping Bell handle the 100-head of cattle he owns. A deferred and rotation grazing plan he has developed with the help of Soil Conservation Service technicians assigned to the district provides for livestock the maximum amount of green forage while allowing the legumes and grasses in pastures to grow at peak capacity.

This year Bell cut 200 tons of hay from his meadows. The hay is stacked away in his barn ready for use. "That'll be as much or more than I'll need before there's green grazing available in the spring," he says.

Usually Bell plants his cotton in 4-foot rows. He says he finds that if complete fertilizer of the sort he uses is put in under the cotton it makes less work with weeds. "Put the fertilizer out broadcast and it helps the weeds about as much as the cotton," he says, "but put it under the cotton and the cotton gets practically all the benefits."

Bell has never forgotten how spreading barnyard manure helped him make his first cotton crop on the farm. He's still spreading the manure. Now, instead of a shovel and a lot of back-breaking labor, Bell has a modern manure-spreader.

Soil building is the keynote of Bell's farming. "I could ruin all the production I have here in three years if I didn't keep putting something back in the land," he asserts.

Maybe he could ruin his production in 3 years, but a look at the profitable production and controlled erosion which conservation farming has brought Bell gives definite promise that he isn't going to start depleting his land.

Grow Peanuts But Keep the Soil

By B. H. Hendrickson

SPANISH peanuts were grown three successive years at the Southern Piedmont Conservation Experiment Station, Watkinsville, Ga. The land had a 7 percent slope. Complete fertilizers were used. Both peanuts and peanut hay were harvested. No crop residue was left on the land. Bad erosion soon ensued. Cotton was planted in 1945. It was fertilized similarly to cotton on an adjoining plot where the soil had been improved by two previous crops of Kobe lespedeza grown for seed. The soil and water losses, and the yields, from both cotton areas were measured.

Cotton grown after peanuts in 1945 lost nearly 4 times as much run-off water and 26 times as much soil, and it yielded less than half as much cotton, as that which was grown after lespedeza.

The station's 6-year measurements of soil losses indicate that good yields of cotton, small grain, and lespedeza can be produced economically in rotation on well-terraced Southern Piedmont cropland of average 7 percent slope. The rate of soil washing is so slow as to indicate that the topsoil to plow depth will last for hundreds of years. Thus far, the yields have been improving gradually.

With continuous row-cropping to cotton and corn, however, the topsoil will be washed away in some 30 to 40 years. With continuous Spanish peanuts, the soil will be lost at an incredible rate.

On terraced sandy land having a gentle 3 percent slope the erosion rate with continuous peanuts was, of course, much slower. After 3 successive peanut crops, yields fell off in 1945 to 1,353 pounds of nuts per acre. Peanuts fertilized similarly but grown in a 2-year rotation, following oats and vetch hay, and volunteer crotalaria, made 2,205 pounds of nuts per acre. During the year when peanuts were grown on the rotated plot, less than half as much water was lost, and less than one-fifth as much soil.

If the soil is not built up by the addition of organic matter, it is apparent that it will fall prey quickly to erosion under continuous row-cropping, regardless of slope. The steeper the slope, the faster the destruction. Good farm practice, therefore, demands the use of crop residues or the addition of organic matter otherwise, prior to the planting of row crops.

Curly Aspen Holds Soil

Curly aspen, a hybrid, combines the firm wood of the gray poplar with the figured but otherwise low-value wood of the white poplar. It is said to grow rapidly from New Hampshire to Kentucky, and is of special interest to soil conservationists because of the spreading, fibrous root systems which are so effective for holding soil in place. Difficult to distinguish from the comparatively worthless white poplar, the curly aspen is best grown from nursery stock or from root sprouts of the genuine hybrid. The wood is useful for veneers.

NOTE.—The author is project supervisor, Southern Piedmont Conservation Experiment Station, Soil Conservation Service, Watkinsville, Ga.



A NEW 16 mm. color-sound motion picture, "Know Your Land," dealing with the technical subject of land classification—but *not* a technical film—is now nearing completion. It will soon be available for general distribution.

Ethan A. Norton, principal soil scientist, served as technical adviser on the film. The story development, direction, and photography, were supplied by the information division, Soil Conservation Service.

The film undertakes to present these fundamental points:

1. Lands differ, like people.
2. Land can be classified according to capabilities.
3. When land has been classified, it can then be treated according to needs.

"Know Your Land" should be useful in stimulating farmer interest and in furthering an understanding of the subject of land capability classification. It is left to field technicians to follow through with an explanation of the local application. Technically accurate, this picture should appeal to farmers and their families, business and professional people, educators, bankers, and civic organizations. It is the first time that an attempt has been made to explain the fundamental principles of land classification in a motion picture.

Kudzu in Philippines

"It may interest you to know that we have an extensive plantation of kudzu in our Hacin Dairy Farm and that we believe kudzu has a good future in soil conservation in this country," writes Vicente A. Araneta, vice president of Gregorio Araneta, Inc., writing to *Soil Conservation Magazine* from Manila. He notes that the corporation plans to establish an agricultural high school "in which livestock and soil conservation will be stressed."



Here being prepared is a scene from the forthcoming motion picture "Know Your Land," soon to be released by the Soil Conservation Service. The picture portrays the use capabilities of the eight land classes. It likens soils to people, as it punches home the theme that sick lands respond to skilled diagnoses and treatments.

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Rodney B. Radford explains a scene in the forthcoming motion picture, "Know Your Land," to the two leading characters, the farmer, at left, and the doctor. Elsewhere in this issue the film is discussed in more detail.



National Farm
Safety Week
July 21-27

JUNE-JULY
1946

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Cover photograph by Ann Ware

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Sixty Acres and Independence

By
A. J. Ernestes



Mr. Flynn with one of the two registered Guernseys from which he is building a foundation herd of purebred dairy cattle.

L. C. FLYNN, a cooperator with the Tri-Creek Soil Conservation District in North Carolina, began and ended a war all by himself right out in the hills of Belews Creek, where he has been farming about 60 acres for the past 5 years.

The soil conservation plan which Flynn worked out for his farm in 1941, in cooperation with the Tri-Creek District, was his official "declaration of war" against soil erosion on his rolling-to-steeply-rolling and low-producing land.

Coincidentally, his plan was prepared during Pearl Harbor month, but his attack on erosion could not be classed as a sneak attack. On the contrary it was openly planned, and embodied every essential required to insure the accomplish-

ment of three objectives: to control erosion, to make a decent living, and to pay off a 100 percent mortgage on the farm. In 1941 he owed \$4,000 on the farm, the original cost of the 60 acres. His livestock and tools, worth about \$400, were clear.

On fields selected as being satisfactory for continuous cultivation, the plan included terracing, contour strip-cropping, and the establishment of a soil-building rotation of crops. Permanent pastures were to be established. Planned woodland improvement was included, to provide the fuel needs of the farm and at the same time improve the growing conditions for future crop trees. Finally, the seeding of wildlife borders was undertaken to control erosion and to give food and shelter for wildlife.

NOTE.—The author is work unit conservationist of the Tri-Creek Soil Conservation District in North Carolina.

To complete the parallel between World War II and Flynn's war on soil erosion, the year 1945 marked the end of each. Flynn recently reported that his conservation plan has been carried out to the letter. He was telling us this while waving before our eyes what he called his "discharge paper," the deed to his farm—a deed 100 percent free of any sort of mortgage. During the 4 years of soil conservation farming he had paid back the \$4,000 he owed, had increased the value of his livestock and equipment to approximately \$1,000, and by the beginning of 1946 had accumulated \$1,500 in cash.

If you, at age 56, had been a tenant farmer for 35 years, like Flynn, you could understand his new feeling of security.

Flynn is so completely sold on soil conservation farming that he now has designated himself as a "one-man army of occupation" to make certain that the soils on his farm will never again lose their

productivity because of erosion. Those are soils which have bounced back to higher production, as reflected in corn yields which have increased from 15 to 70 bushels per acre.



Soil conservation paid off the \$4,000 mortgage in four years, through increased production. No wonder Mr. and Mrs. Flynn smile happily as they look at the document in the living room of their home.

War Production And Soil Deterioration

NOTE.—This article is taken from the Annual Report of Mahaska County Soil Conservation District Commissioners, Oska-loosa, Iowa; John Eveland, chairman, Cecil Smith and Ike Herney, members.

THE FARMERS of Mahaska County sent their acres to war and too many of those acres are not going to come back. We of this county shall regret their loss. While this loss can never have the place in our memories comparable to those brave GI's who will never return, still the loss of so appreciable an amount of the material resources of this country is bound to be felt by those of this present generation and of generations to come.

The commissioners of the Mahaska County Soil Conservation District and those associated with us, have used our every effort and all the resources available to us to make damage done as small as possible. Our efforts were not enough. Though that which we have accomplished is important, we had to view with much sadness and dismay too many of our fellow citizens using the precious resources of our soil with reckless abandon, in order to produce food and fibre for our war effort. No one will say that the farmers of this county have not done a magnificent production job. We did produce and in spite of great handicaps in manpower and equipment, turned out during the war

years, food in ever-increasing abundance. Surely it was necessary that we do this, but now that the war is over (or practically so) it is time that we count the loss and begin to plan to rebuild that which has been torn down.

While too many of our fellow farmers paid too little attention and failed to use ordinary prudence in protecting the welfare of the soil, we cannot say that of all of them. One of the bright spots in this whole period, one of the things that shines like a bright light 'mid encircling gloom, is the accomplishments of the 300 Mahaska County farmers who sent their acres to war, protected by contours, terraces, strip cropping, and better rotations and land use. If any group of citizens were to be selected in Mahaska County to be decorated, shall we say, "For meritorious conduct in line of duty," surely these would be the ones. Not only have they produced as much or more than their neighbors, but they have done it in more efficient and profitable manner and the casualty list (as far as the land is concerned) has been nil.

The commissioners would like to mention some of the obstacles to better land use that have been apparent to us during the 4 years of our existence. First and paramount, is the lack of education. We feel that if there were some way of bringing the benefits of soil conservation home to the farmer in a much more extensive way than we have used

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YOUNG IDEAS

wake up an old farm

By

Robert S. Whitaker



WESLEY Hamric of Hickory Plains, Ark., is only 27 years old. He's doing a better job of conservation farming on his 64-acre place than most men with more land and longer experience. Young Hamric is making a living for his family of five. He is also controlling erosion and building soil fertility, so he can get higher yields and increased income in the future.

Milk cows and row crops are Hamric's main enterprises. Wesley has 20 acres in corn and cot-

NOTE.—The author is work unit conservationist, Soil Conservation Service, Des Arc, Ark.



Hamric clears poor-quality woodland, which he will convert to good pasture.

This pond saves time and labor. Young Hamric no longer has to pump all the water for his cows. He'll have some fish, too.

ton, 10 acres in improved pasture, and the rest in unimproved woodland pasture.

He started conservation farming a little more than a year ago. That was when he began noticing gullies beginning in his fields. His conservation plan, worked out with Soil Conservation Service technicians assigned to the Des Arc Soil Conservation District, called for correct land use, sound rotations, contour cultivation, and terraces to help stop the gullies.

Wesley grows Austrian winter peas for erosion control and soil building on his cultivated land. This year he made ten 500-pound bales on 10 acres. That's about twice what he produced before he began using the winter legume.

Wesley's conservation plan saves labor. He formerly had to pump water for his stock by hand. Now a farm pond furnishes the water without pumping. It was recently stocked with bream and bass. Pan-size fish should be available by late next summer. Wesley helps the fish grow by putting fertilizer in the pond.

As soon as he can get around to it, Wesley plans to clear most of his 32 acres of woodland pasture, leaving only enough trees for fuel. Thus far he has cleaned up 5 acres and has retired another 5 to pasture which formerly was in cultivation. The

latter 5 was on a rolling hillside where each rain caused severe erosion, but it doesn't wash now under its good grass cover.

A drainageway that has been too wet to cultivate crosses his cultivated land. He plans to retire that area to hay meadow.

The 10 acres of open pasture have been seeded to carpet grass, lespedeza, and white dutch clover. Wesley keeps seven cows and a mule on the pasture all year. The cows get protein feed at milking time.

Wesley figures his total feed and hay bill at \$200 a year. The milk which he sells to a cheese company and a creamery brings in around \$500 a year. His family has all the milk it wants to drink. As

the pasture improves, the hay bill will largely disappear.

A Little Rock dairy has extended its milk route past the Hamric home. Wesley plans to sell milk to the concern as soon as he can build a new barn with a concrete floor. He expects to produce a grade "A" product.

Wesley grows enough corn to feed out about three hogs each year. The corn has the benefit of Austrian winter peas which are plowed under as green manure each spring. "The way I'm handling my land now, it produces as well as it did when it was first cleared," says Hamric. "I'm going to keep on using peas or some other legume every winter. It pays."

MONEY from MARSHES

By C. W. Gee



Francis T. Doyle harvests a rat crop.

WHEN Francis T. Doyle bought his farm near Prior Lake, Minn., back in 1941, he knew that one-fourth of it was "waste" land. Marshes cover 100 acres. Yet from this so-called waste land,

NOTE.—The author is head, regional information section, Soil Conservation Service, Milwaukee, Wis.

Doyle has collected \$2,425 during the past three trapping seasons. Doyle is a cooperator in the Scott County Soil Conservation District.

"I bought this farm in 1941," Doyle recalls, "but did not move on it until a year later. The previous owner wanted \$16,000 for the 400 acres but I



Scott County marsh, typical of many in northern states;
a source of farm income from muskrat pelts.

finally bought it for \$12,000, which I thought was a fair price. I did not place any value on the 100 acres of marshes. I considered these areas as so much waste land."

Since then Minnesota has had three open seasons on muskrat. The first season, Doyle trapped approximately \$775 worth of rats from his two marshes and collected an extra \$150 by leasing the same land out to duck and pheasant hunters.

In 1943 he sold \$725 worth of pelts and took in \$150 more from the hunters. There was no open season on muskrats in 1944 but the hunting leases again paid Doyle \$150.

During the 1942 and 1943 seasons, Doyle worked out a bonus system with his hired man. "We shared our trapping returns on a 50-50 basis," he said. "Needless to say, I was able to keep a hired man during those years when so many other farmers found considerable difficulty in holding their help.

"I made all of my own sets and took care of all the rat hides during the 1945 season," he said. "Trapping was not especially good but I could have caught many more rats if I had trapped the larger houses. It has always been my policy to leave plenty of rats. However, I don't usually leave as many as I did in 1945.

"My net income for 1945 was about \$300 from muskrats and \$175 from duck and pheasant hunting rights. I have already leased the property out for 1946 and my net income from hunting rights this year will be \$225."

Doyle is no professional trapper, however. With the assistance of Soil Conservation Service technicians, he has worked out a complete farm

conservation plan on his land, several miles south of Prior Lake. He regards wildlife as but one source of farm income, though an important one. He places wood lots in the same category.

In 1942, Doyle built a barn, using 21,000 board feet of home-sawed lumber and dimension stock which grew in his own woodland. This year he will use 10,000 board feet of home-sawed lumber to build a garage and machine shed.

"I feel that my wood lot is a good wildlife area, too," he said, "although I have never set a price on the skunk, raccoon, fox, and rabbits found there. They have provided me with a lot of recreation."

Setting a cash value on his muskrat-haven, is another matter. With fair luck, his marsh income should pass \$3,000 this winter.

Both marshes are within a short distance of his improvements and on his own land. "The beauty of this is that I can take my own good time in trapping," he said. "All the trapping seasons come in December when farm work consists largely of doing routine chores. I then spend about 5 hours a day making sets and taking care of the rats."

In addition to being a district cooperator, Doyle is also a county AAA committeeman. He is well acquainted with such conservation practices as draining marsh land.

"Several contractors who own draglines and ditching equipment have stopped in and tried to talk me into ditching these marshes," he said. "I definitely would not drain them. Without putting a cent of money into the project I could easily have a net income of \$9 or \$10 an acre from the two

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CO-OP COMBINES harvest seed

By W. M. Nixon

THE cooperative use of combines helped to overcome a serious obstacle to progress in 160-odd soil conservation districts in Texas and Oklahoma. The handicap was the lack of sufficient amounts of grass and legume seeds. Millions of pounds of such seeds annually are required to establish a protective vegetative cover on eroding lands and to increase soil productivity.

Millions of acres of eroded and depleted soil in Texas and Oklahoma must be returned to permanent vegetation. It has been demonstrated repeatedly that permanent vegetation put on unproductive cultivated land can turn losses or uncertainty into a good, dependable income.

Grasses and legumes are used also in a coordinated soil conservation program to provide safe disposal of surplus run-off water through vegetative outlet channels and meadow or pasture waterways.

The limiting factor in the widespread use of grasses and legumes has been the lack of certain seeds in commercial channels. In recent years many seed dealers have tried to meet the needs of

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Fort Worth, Tex.

Combining hubam clover from windrows. P. B. Berry, Ellis County, Tex., estimated his hubam seed yield from this six-acre field at about 550 pounds per acre.



Combining hairy vetch and abruzzi rye for seed in Brown-Mills Soil Conservation District, Brown County, Tex. G. G. Goss, district supervisor, is on tractor. Yields ran 214 pounds rye seed per acre, 66 pounds vetch seed, on unfertilized land; 224 pounds rye seed, 620 pounds vetch, on fertilized land. Sale of seeds brought \$18.87 per acre from unfertilized crop, \$96.88 from fertilized. The Goss farm benefited also from green tonnage.

soil conservation district cooperators by stocking as many of the seeds as they could obtain. In most instances, however, the demand has exceeded the supply. In many districts cooperators were willing to plant grass and legume seeds to supply their own needs and those of other district cooperators, provided facilities could be made available for harvesting. In some districts there were no combines available for seed harvesting. Where there were privately-owned combines, they were usually tied up in grain harvesting. After studying this problem, soil conservation district supervisors felt that if harvesting facilities could be provided to the districts, grass and legume seeds could be harvested successfully and profitably. Success would encourage the planting and harvesting of such crops on a larger scale.

To fill this need the Soil Conservation Service in 1945 bought 40 combines and loaned them to soil conservation districts in Texas and Oklahoma. The district supervisors worked out a cooperative plan of operation, making the combines available to cooperators on reasonable time and rental schedules. The harvesting of more than 800,000 pounds of grass and legume seeds last year is convincing testimony to the success of this plan. Prospects are that several million pounds of seed will be harvested this year. The whole program of coordinated conservation has been given great impetus. Among the grass seeds harvested were bluestems, blue grama, hairy grama, sideoats grama, weeping lovegrass, blue panic, and Rhodes grass. Legume seed harvested included crotalaria, vetch, sweet clover, Singletary peas, blue lupines, and cowpeas.

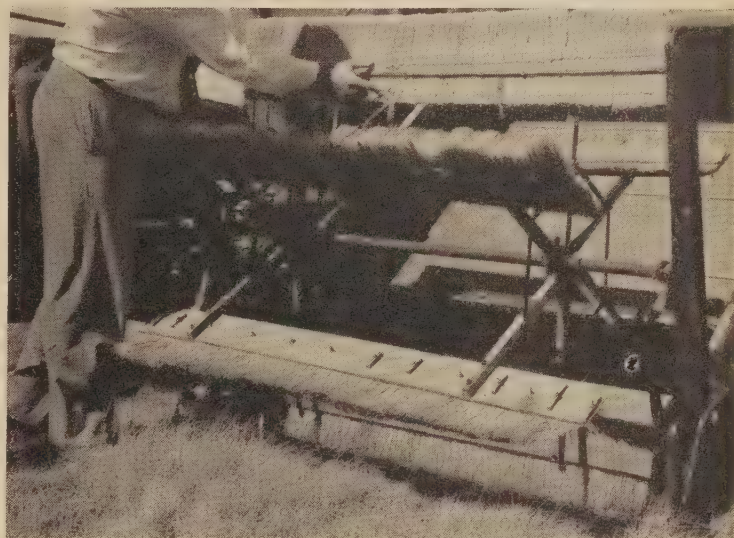
While producing and harvesting these seeds to help in the conservation program and to improve their own lands, farmers found that they could materially increase their cash income by the sale of the seeds.

Another result of the success of seed harvesting is the purchase of combines by cooperators themselves who have seen how cash income can be increased substantially through the sale of seeds while at the same time the land can be improved through the use of grass and legume crops.

Soil conservation district supervisors unanimously agree that the loan of combines by the Soil Conservation Service to the districts has been a worth while undertaking. The plan has served: (1) to fill a need for grass and legume seeds when the need could not be filled in any other way, and

(2) to demonstrate how the seeds could be harvested successfully so that farmers could carry on themselves.

Charles C. Smith, district conservationist at Alice, Tex., reports: "Loan of the combine to the district was valuable because the machine was used on small plots when privately-owned combines were busy with the grain crop. Also, the combine set a standard of performance not previously equalled. By properly equipping and adjusting the combine, demonstrators have been able to harvest seed in a clean condition, with little re-cleaning necessary. Most fields would not have been harvested but for the district combine."



Close-up shows how reel bats may be altered by addition of broomstraw, which increases efficiency of grass-seed collection.

W. R. Heizer, district conservationist at Dublin, Tex., reported: "The loan of these combines has advanced the district conservation work, especially in winter-legume cover crops and clover planting, for seeds have been made available when there has been a shortage. By having these seeds immediately available, many more cooperators planted cover crops last fall than ever before. Also the production of legume, clover, and grass seeds by local cooperators has been encouraged. Cooperators who used combines declared they were convinced that vetch, clover, and grass could be harvested successfully for seeds. We know of three new combines that have been purchased by cooperators who grow vetch and other legume seeds; we know also of several supervisors and other cooperators who will purchase combines when they become available.

"Use of the combines stimulated interest in soil conservation in general. There has been a notice-

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How Gila Valley Farmers Met Disaster

By Elizabeth Poe

EFFECTIVE leadership by a soil conservation district enabled a whole farming community to recover from a flood that in September 1944 brought a \$400,000 loss to crops, irrigation systems, livestock and other farm properties in the Gila Valley, New Mexico. The damage from flood and hail was the worst in 35 years.

The flood came at the time of year when the people prepare their land for irrigated pastures, fall grains, barley, and alfalfa, and profitable fall crops of sugar beet seed. Cotton had not been picked nor other crops harvested. It was the worst possible time for a Valley farmer to be without water, and the flood made almost 15,000 acres of rich valley temporarily arid. Structures were ruined on four canals which take water from the Gila River to the farms, and it stopped the water supply to two other canals below the flood area.

Three thousand acres of cotton valued at \$70,000 was destroyed by flood. Hail, which came the size of marbles, ruined \$68,000 worth of cotton. Damage to livestock buildings and equipment and other farm properties was estimated at \$25,000. When the canals that bring water from the Gila River to the fertile fields were inspected, it was found

NOTE.—The author is head of Press and Radio Section, Soil Conservation Service, Albuquerque, N. Mex.

Reconstruction of a siphon heading on Butler Wash, near Safford, started soon after the September flood.

that \$70,000 would be needed to put them back in working order.

A survey of the damage was started as soon as the flood was over. A detailed analysis of the type of damage, the number of acres of each crop ruined and what was lost was made immediately by Mervin H. Wallace, conservationist for the Soil Conservation Service stationed in Safford. Even before the survey was finished, action started. The supervisors of the Gila Valley Soil Conservation District, themselves farmers who had suffered along with everyone else, called the people together for a meeting. Representatives of the major canal companies attended the meeting, together with people from the Farm Security Administration, the Disaster Loan Corporation, and other Federal agencies. The Soil Conservation Service, however, was the agency equipped to do the most. It could lend equipment and supply engineering advice for reconstruction.

The Soil Conservation Service office above the Safford post office, where the meeting was held, was packed.

"We've got one tractor and a dragline. They're both broken down," explained the district super-

visors. "We must organize to get every bit of equipment available."

And so an equipment pool was started. The Graham County Commissioners said they would turn over the county road equipment to the district. That meant one crawler tractor with a bulldozer and a power shovel. Four bulldozer outfits were available from private owners. Two neighboring soil conservation districts sent in one tractor each.

With this much equipment at hand and the canal companies organized for action, the district supervisors were in a position to begin. At the meeting everyone agreed to let the district supervisors coordinate all equipment and work out a priority system for its use. The plan was to put the canals that needed the least work into operation first. After the canals were opened, the equipment was to be used on farms to clear away the brush and boulders and silt deposited by the flood. The land to be planted in fall crops was marked for first clearance.

Things worked out that way, and by October 12, ten days after the meeting, the Union canal was back in operation. Nine days later the Highline canal was carrying water.

The disaster had proved that channels and structures designed to take care of ordinary floods were inadequate. This was particularly true of channels supposed to carry the flow of side washes from the hills to the river. Over 10,000 feet of one canal was entirely filled and several siphons were plugged up. At one point it was decided to abandon 2,100 feet and build a new canal. Over 27,000 cubic yards of material had to be moved to do it. At another point a wash roared down a mountain canyon, fanned out at the mouth and spread over seven farms.

Siphons six feet in diameter are being constructed to carry one canal under three washes. The washes are being channeled from the hills on the upper side of the canal down to the river on the other side. This precaution will prevent normal floods from doing similar damage. For two long stretches, 2,000 and 1,300 feet, the canal had to be completely relocated. The cost of reconstruction on but one of the six canals amounted to \$50,000.

Right-of-way squabbles developed over the relocation of some of the washes, and the Gila Valley Soil Conservation District supervisors were named arbitrators to settle the disputes, because the board was considered a disinterested body with sufficient

knowledge of conditions to judge fairly. Again, when \$1,500 was donated by a private company to help out in reconstruction, a survey of all agencies represented in Safford revealed that none of them was in a position to parcel out the money to the farmers who needed it most. When the company representative approached the district, the supervisors convinced him that a new tractor, to be used all over the district, would be of greater and more lasting benefit to the area than relief money doled out to a few who needed it more than others.

Although Federal loan agencies approve loans to the stricken farmers, nobody took one. The district rental policy on equipment remained the same throughout the emergency, and the county and the private owners who loaned equipment set up their own rates for rentals. The canal companies received from \$1 to \$2 an acre from the AAA for new improvements made on the canals, but no money came for the repairs.

The only farmland in the wake of the flood that was not badly damaged was 800 acres of irrigated pastures planted to improve grass and legume mixtures that actually thrived on the inundation. The planting of these pastures to improved mixtures has been promoted by the three Soil Conservation Districts in the Safford and Duncan area for several years because of their excellent erosion-control and feed-production abilities.

By 1945 there were only 12 acres of land in the flooded valley that hadn't been restored to crop

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A siphon six feet across was installed on Graham Wash after destruction of the old flood-control structures.

Nature Planted Legumes, too

By Donald R. Cornelius

Editor's note.—This article should be regarded as a preliminary report. The information is largely observational. Basis has been established for further study of these potentially important plants. Still lacking is a sufficient supply of seed; also, adequate knowledge of correct cultural practices.

NATIVE legumes deserve more consideration. In the Great Plains, they are thought to give to native grasses the same sort of boost that alfalfa and the tame clovers give to tame grasses. At least that is indicated at the Soil Conservation Service nursery at Manhattan, Kans. Native-grass mixtures planted there made more vigorous and productive stands when seeded with a legume.

One mixture—big and little bluestem, switchgrass, and side-oats grama—was seeded on sloping upland plots in 1940. Round-headed bush clover *Lespedeza capitata* was included in some of these plantings. Last year the plots which included bush clover yielded 7,951 pounds of forage per acre—6,965 pounds of grass and 986 pounds of clover—compared with 6,344 pounds where clover was not used.

Similar tests with partridge pea *Chamecrista fasciculata*, an annual, were made more recently on thin, eroded, upland clay soil at the station. This legume is a rapid invader on road cuts, sand dunes, badly eroded land, and other areas very low in fertility. Where it was included in mixtures, the grass grew more rapidly during the first year and there were fewer undesirable weedy plants.

These performances seem important, since increasing the density of stand and growth of grass increases its ability to protect the land and conserve water. This also makes the grass more worth while in terms of pasture, hay or seed. There is a close relation between the popularity of grass and its ability to pay its way.

Little attention has been paid to native legumes theretofore, even though a great deal of progress

has been made with the introduction of new grasses and the harvesting and planting of native species. This was due partly to the lack of seed and information on seed treatment. Partly responsible, also, was the failure of many ranchers to recognize the value of the native legumes. They classed as weeds all plants other than grasses.

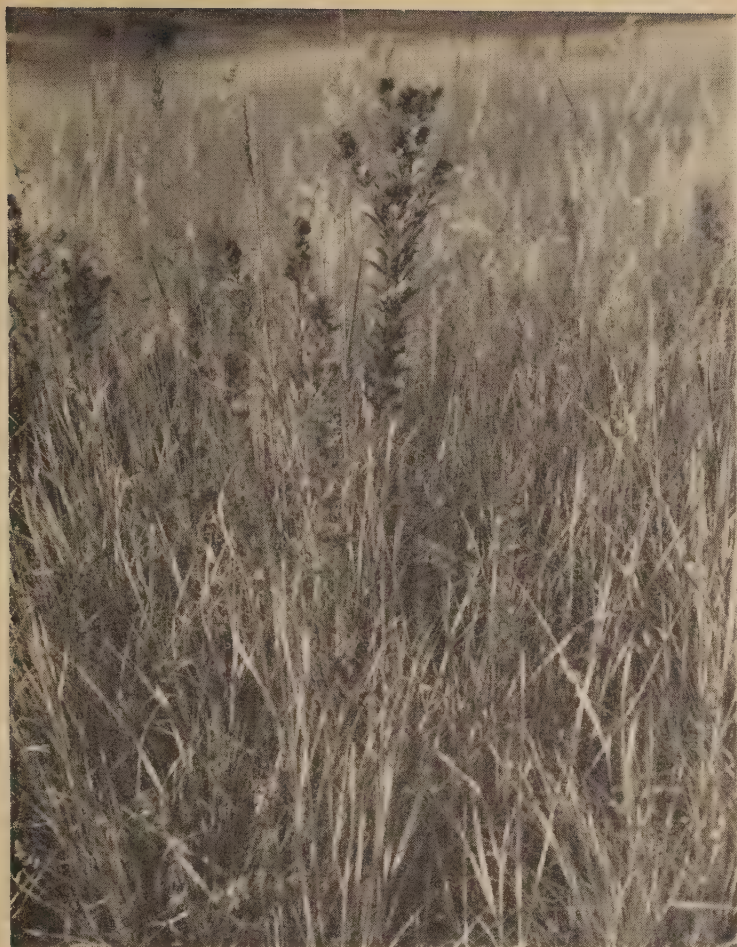
Numerous native legumes are to be found in meadows that have never been plowed and in areas of virgin prairie along roadsides and in cemeteries. They differ widely in their appeal to livestock. The several species of wild indigo *Baptisia* and wild alfalfa *Psoralea floribunda*, for instance, are grazed very reluctantly or not at all by cattle, but sheep have been known to kill out wild alfalfa in 3 years. Some of the legumes are so well liked that cattle are likely to graze them out of existence, unless it is prevented. Still others, such as the poisonous locoweed *Oxytropis lambertii* and wooly locoweed *Astragalus millissimum* are to be avoided, and milk vetch *Astragalus racemosus* is dangerous when grown on selenium-bearing soils.

It has been noted, too, that native legumes come in as quickly as, and sometimes before, grass on abandoned land that is going through the time-consuming process of natural revegetation. This is especially true of severely eroded land. There, such legumes as tick trefoil *Desmodium illinoense*, partridge pea, prairie clover *Petalostemum multiflorum*, round-headed bush clover, dalea *Parosela enneandra*, and many others will be found. They evidently are the first step in building up nearly infertile soils. Some are best adapted to sandy land, among them prairie bird's-foot trefoil *Lotus americanus* and wild bean *Strophostyles helvola* and *Strophostyles leisperma*.

One in particular—leadplant *Amorpha canescens*—seems to thrive on most sites and to escape too close grazing. It is a low-growing shrubby plant, never too coarse or weedy for mowing but coarse enough that stock do not graze it too heavily. When cut annually, the stems are small and make forage of good quality.

The native legumes seem to function much as tame legumes, with which farmers are generally

NOTE.—The author was formerly associate agronomist, Soil Conservation Service Nursery, Manhattan, Kans. He is now with the California Forest and Range Experiment Station, U. S. Forest Service, Berkeley, Calif.



Native grass-legume mixture planted April 1939 on eroded upland near Manhattan, Kan.; photographed October 1945. Seed was natural mixture from prairie combined in Payne County, Okla. Grasses are little bluestem, switchgrass, Indian grass, and big bluestem. Legumes are round-headed bush clover (*Lespedeza capitata*), bush clover (*Lespedeza stuevei angustifolia*), and tick trefoil (*Desmodium illinoense*).

familiar but which cannot withstand drought. They are nitrogen producers, of course. They usually go deeper for their food and moisture than the grasses and are thus not fiercely competitive. And apparently they are high in protein, minerals and vitamins. As an illustration, a variety of ground plum *Astragalus plattensis* collected at Towner, Colo., last June was found to contain 19.8 percent protein. This is well above the 6 percent protein content of buffalo grass at that time of year.

Their time of growth varies, too. Ground plum starts growth fully five weeks before the warm season grasses and is usually in full bloom when livestock are turned out to grass in spring. In contrast, prairie clover matures around Manhattan about frost time in early October. Its use comes late in the season. An area of prairie clover was located in a pasture at flowering time in Septem-

ber; when the seed was to have been harvested a month later, the tops had been eaten and the seed supply was gone. It is probable that the native legumes supply some nutrients and vitamins at times when the grasses are low in them.

Production of native legume seed probably will have to be in nursery plots or on farm seed plots. The plants under natural conditions are scattered and harvest of the seed is tedious and expensive. Furthermore, the problem of seed treatment has only partly been solved. To date, the three bush clovers *Lespedeza capitata*, *Lespedeza virginia*, and *Lespedeza stuevei* and one variety of ground plum *Astragalus crassicarpos*, have responded to scarification just before seeding. The process is to soak the seed 15 minutes in concentrated sulphuric acid, wash it in clear water, and dry it. Some mechanical method may be adapted in time.

Testing of native legumes and development of seed treatment are just begun, it is true, but the prospects are promising. It may not be too long before a farmer or rancher will be able to select for seeding those native legumes which suit his purpose best. Judging from what has been seen at the Manhattan nursery, this will pay in the production of more vigorous stands to protect land and conserve water, and in the production of forage.

What of the Aleutians?

Albert M. Easterday Adds an Interesting Postscript to Mr. Rockie's Article

THE JANUARY issue of *Soil Conservation* carries a most timely article on agricultural possibilities in Alaska. Naturally, covering such a wide field, descriptions were brief. The writer would like to supplement the information on the Aleutians by some observations of his own.

Much more has been said against the Aleutians than has ever been said in their favor. These criticisms may be partly due to the original habitat of the critics. If the critic comes from a land graced by forests, he is quick to note the lack of trees on the Aleutians. Likewise, if he comes

NOTE.—The article "What of Alaska?" in the January issue of *Soil Conservation* evoked much discussion. Here reproduced is a letter to the Editor from a former engineer in the Soil Conservation Service. Mr. Easterday went to Alaska in 1943 as engineer on erosion control for airports. At present he is with the War Department's office of the Division Engineer in Omaha, Nebr.

from a land of gentle breezes and sunshine, he may make the worst of that land, fog-draped during the summer season, or of the occasional fierce blasts of winter. However, the native Aleuts were happy on their grass covered islands where often only the horizon limited a man's view and the seasons brought an abundance of choice seafood and fine furs.

While performing duties incident to our recent conflict, the writer had the opportunity of observing some of the more important islands of the Aleutian chain. Usually this far-flung strip of America appears as an insert on a map of Alaska and few observers realize its magnitude and extent.

Generally speaking, the Aleutian chain enjoys more moisture than the great central valleys of Alaska, without the severe cold of winter or the extreme heat of summer. The rainfall is ample to produce a lush growth of native grasses, yet without the heavy precipitation common to southeastern Alaska. However, neither the Russians nor the Aleuts seem to have been farmers but rather, they were fishermen and fur hunters. These islands seem to have the same possibilities of the mainland and the added advantages of a more even temperature and no permafrost. The temperature ranges from about 15° to 60°.

Although of volcanic origin, the soil is a combination of volcanic ash, glacial silt, fine wind-blown sand, and humus. When plowed up and damp, this rich dark brown soil emits an odor reminiscent of a feedlot on a warm, rainy day.

Beginning with Unalaska, this chain sweeps farther south than Prince Rupert, British Columbia, and in a long graceful curve sweeps north and west to about 172°30' east longitude, only a few hundred miles from the Russian Siberian mainland. In 1805, we are told, the Russians made an attempt to start trees and, although they are still growing on Unalaska, no seedlings were produced. Likewise, the trees planted around the old Russian stone church on Atka were growing nicely until they were killed by the fire which destroyed the building in 1942 or 1943 when we were carrying out a scorched-earth program.

Prior to Pearl Harbor, a reportedly prosperous sheep business flourished on Unalaska; however, all I saw were some drift fences and wonderful grass pastures, but no sheep. The native grasses have been improved by addition of domestic timothy.

The first island of importance beyond Unalaska is Umnak, which is about 70 miles long and about 25 miles wide. The rim of a vast volcanic crater some 15 miles across is topped by Mountain Tulik which dominates the scene. This island is unique in that it is really a great cinder pile with just enough soil to support a fair covering of grass. *Calamagrostis*, timothy, beachrye, and other wild grasses were observed. Although unsuited for cultivation, it is wonderful pasture. Some 20 years or so ago a small band of caribou were released there. When our armed forces took possession in 1942 there were about 4,000 head. Some inroads were made during the early days of occupation but now, due to active intervention on the part of the Alaska Game Commission and cooperation from Army officials, the caribou are again being protected. On this large island are thousands of acres of excellent grass and at the present time overgrazing is no problem.

The caribou enjoys a dense oily coat of fine hair which effectively sheds the rain. Some of our northern breeds of cattle should also thrive under prevailing Aleutian weather conditions. The natural terrain provides wind breaks against the much publicized Williwaw. There are no predators on any of the Aleutian chain larger than a fox and fences are necessary only as a control of grazing.

Similar conditions prevail out as far as Adak. Although somewhat mountainous, wide level areas could easily become hay meadows. However, the damp climate at harvest time makes it difficult to dry hay. Although some hay is cured at Anchorage by the Norwegian method of piling a few forkfulls up around a stick stuck into the ground, the method is unsuited for large-scale operations and siloing would probably be the solution to this problem. Although Adak has definite possibilities for the cattle business and the level areas would be suitable to agriculture, the writer knows of no effort to plant gardens. Experimental plots of grass gave satisfactory results under very unfavorable handicaps. Dust from a paving mixer plant fell on the plots almost continuously but in spite of it, the grass grew.

Amchitka lies well to the south along the chain and rises about 200 feet above the sea. The surface is rolling or gently sloping and supports a wide variety of grasses which have grown, died, and decayed for countless years. The Russians and Aleuts who had occupied the village were

primarily fishermen and fur hunters. No evidence of gardens was observed but with soil capable of producing such luxuriant stands of grass, hardy vegetables should do equally well.

Attu and other of the far western islands produce rank growths of grass and some varieties of berries grow in abundance but deep snows would necessitate winter feeding of livestock. Most of the beautiful flat valleys would require draining before extensive tracts could be turned by the plow. They are now natural hay meadows.

All these islands seem capable of producing sustenance crops of vegetables for those resolute souls who would make a fortune at fur farming or fishing. But it would appear that neither the Aleutians nor Alaska offers much to the big-scale agriculturist because of a limited market.

Even the Matanuska Valley felt the pinch of a circumscribed market before the war flooded Alaska with soldiers and civilians brought there by military activities. So long as the mainland is heavily populated with military personnel, market gardening, poultry raising, and dairying will find a lucrative market; but the peacetime future would not seem too attractive for such ventures

on a large scale. All the markets must be home markets.

Both fishing and fur-farming offer profits to those who have the initial capital and willingness to face frontier conditions. Fishing, especially, is seasonal and the area would offer little in the way of enterprises or employment during the rest of the year.

Hence, a poor commercial market for the farmer and market gardener exists. Likewise, the stockman would enjoy low production costs on the Aleutian chain, but he too would be confronted with the problem of a market. However, a limited local market may be produced by the development of both fisheries and mining to their fullest capacities.

It is rumored that valuable minerals have been found along the rim of the crater on Umnak, and that the delicious crabmeat the Japs sold us before the war came from the Aleutians and, very likely, from Adak.

It would seem that the Aleutians deserve the honor of being thoroughly investigated and that they may hold far more possibilities than anyone realizes.

MONEY FROM MARSHES

(Continued from page 271)

marshes any year there was an open season on muskrats. I often wish I could parcel out my entire farm on the same basis. It would bring me a comfortable living with a great deal less effort than I put into my regular farm work."

Dewey V. Hahn, work unit conservationist in the Scott county district, points out that Minnesota, Michigan, and Wisconsin have thousands of acres of marsh land similar to Doyle's. "Many other farmers could add hundreds of dollars to their cash incomes," Hahn said, "by purchasing some steel traps."

CO-OP COMBINES

(Continued from page 273)

able increase in the number of visitors to the soil conservation district office who seek assistance in pasture management and inquire about seed harvesting and seed sources for revegetation of some of their land."

With an increasing supply of grass and legume seeds now available, the soil-conservation district program can move forward at a faster pace.

WAR PRODUCTION

(Continued from page 268)

before, much more could be accomplished. The Extension Service and the Farm Bureau, the Vocational Agriculture School in Oskaloosa, the various service groups and, of course, the members of the Soil Conservation Service in Mahaska County, have all done a wonderful job and perhaps in the near future, as more talent and we hope more funds are available, this effort can be increased.

GILA VALLEY

(Continued from page 275)

production. The 8,300 acres directly affected by the flood were producing food, and the 6,000 acres indirectly affected when the water supply was cut off were back in production. The job was a speedy one that required re-incorporation of two canal companies. It was finished in record time, and the people of the Gila Valley are benefitting today because they delegated authority and worked together to get the job done.

A Look at Paricutin

By
W. C. Lowdermilk
and
Reed W. Bailey



ON FEBRUARY 20, 1943, a volcano burst out of the cornfield of farmer Dionisio Pulido near the village of Paricutin in the State of Michoacan, Mexico. Violent earthquakes had given warning. But the village folk of this picturesque region of corn and pine were not prepared for what was to come, because in their memory no volcano had occurred before.

NOTE.—The authors are assistant chief, Soil Conservation Service, Washington, D. C., and director, Intermountain Forest and Range Experiment Station, Forest Service, Ogden, Utah, respectively. The material for this article was obtained while the authors were on leave from the Federal Government, with travel expenses paid by the National Research Council.

Close-up of volcano fumaroles; lava, still warm, in foreground.

Their first knowledge of what was happening came with the thing itself, as they watched great puffs of smoke and fire shoot skyward, throwing out great showers of volcanic bombs. (In 10 months' time they built up a cone 1,500 feet high.) Fine grained volcanic "ash" rode the columns of violently rolling, turbulent clouds. Then, as the clouds cooled off, ash rained down over the countryside. Some ash fell as far as Mexico City, about 200 miles away. Near the volcano the ash



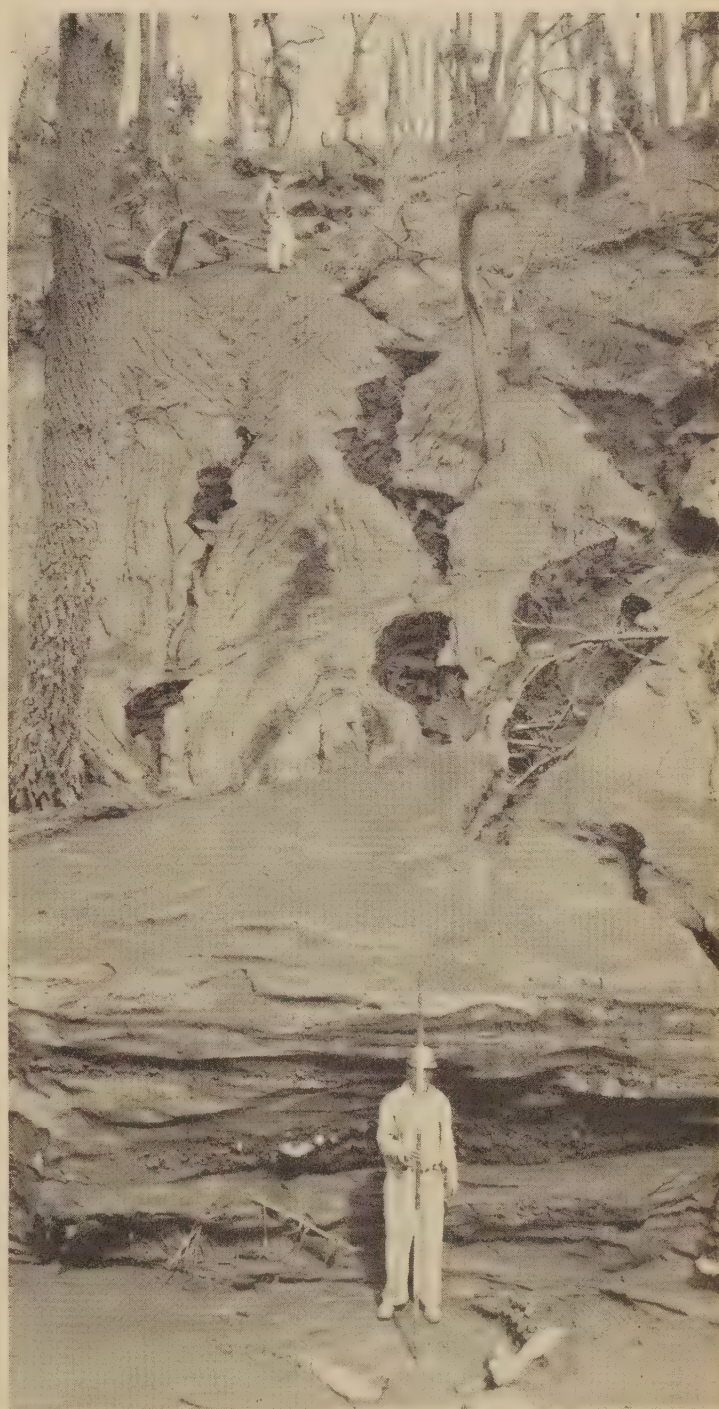
At Narito, accelerated run-off from the ash-covered landscape has cut a gully 25 feet deep through the recent ash deposit of less than three feet into older deposits of ash.

layer increased rapidly throughout the remainder of 1943, but ash fall diminished thereafter.

Lava, as a grayish, moving mass of thick, crackling, crumbling rock, crept forth from openings near the growing cone. As flakes of rock fell away from the "front," glowing red showed forth in the awesome flow. Slowly but inexorably this grayish diabolical river of molten rock moved down slope. It spread and enveloped fields, trees, and all but a little of the village of San Juan de Parangaricutiro. Only the tower of the village church still stands above the jagged mass of lava beneath which the village lies. Later on, the tide of lava swallowed up the village of Paricutin.

Such were some of the accounts of what happened, as told to us by villagers of the volcanic

area, and two officials of the Mexico Soil Conservation Service. We were there at the invitation of Dr. Richard E. Fuller, chairman of the National Research Council Committee, to collaborate with the Comision Impulsora y Coordinadora de la Investigacion Cientifica de Mexico in the study of Paricutin. Sr. Engr. Patino, director of the Departamento de Conservacion de Suelos, collaborated with us in the study and assigned Ing. Jose Navarro y Samano and Ing. Davio Llerena Lanza-gorta to carry on field work with us. The laboratories of the Departamento de Conservacion de Suelos made analyses of samples of ash and



Gullying of slope in forest. Storm floods have cut channels below original level.



Milk cow, brought back by villagers, grazing on new stands of Bermuda. During dry season in winter considerable wind erosion occurs, evidenced by hummocks protected by clumps of this grass.

determinations of laden flood waters. This report covers only the more general aspects of the spectacular examples of erosion that we found had taken place, and were taking place during our study of the area about the volcano, as well as the effects of ash-laden floods on irrigation works in the Los Reyes Valley.

From the beginning of the eruption and during our field work out from the Caseta, volcanic ash fell on the countryside as heavy black snow that would not melt. It overturned trees, bent others to the ground, and broke brittle branches. Forests nearby were heavily damaged. Grass was smothered, depriving livestock and game of forage. Fields that make up about 30 percent of the land area, and lie chiefly in valley floors, were covered to depths that stopped the growing of the usual crop of corn. The livelihoods of villagers immediately about the volcano were endangered. They fled Paricutin and San Juan de Parangaricutiro because of lava flows and were resettled by the government elsewhere. But villagers of Angahuan and Zirosto refused to leave their homes. They resorted to other occupations for wages to buy their food. A great influx of tourists gave employment to inhabitants of Angahuan, whereas those of Zirosto were employed on repairing roads and in hewing and delivery of railroad ties out of the surrounding forests. All look forward to a time when the ash-covered fields may be reclaimed for growing food crops again.

The volcano may be a new event to the local inhabitants, but it is merely an incident in the geological history of the country. The landscape east and west, north and south of Paricutin, is made

up of hundreds of volcanic cones of such volcanos of the past—some larger, some smaller. From their flanks volcanic ash had been washed and deposited to make charming intermountain valleys in some of which nestle charming lakes, as at Patzcuaro. The pine forests that make up the dominant type of vegetation of this area came back again, covering the country. When man spread into this region, the forest was cleared away on corn, and little else.

about 30 percent of the area for the cultivation of

It was into this land of landscape, on the western edge of the central plateau of Mexico that rises to 7,000 to 8,000 feet in elevation, that the ancestors of the present inhabitants came long ago to work out their living. It is a region of summer rains, with dry winters. Indian corn-maize was the principal food crop then, and is so today. Forests were cleared away from valley floors for crops. The people live in villages of wooden houses of an unusual design. House walls are sturdy of hewed thick plankings, and roofs are steep and covered with pine shakes. Some anthropologists suggest that the steep roofs, unlike those in other parts of Mexico, indicate that early inhabitants, possibly forerunners of the present Tarascan people, had learned from the fall of volcanic ash to pitch their roofs sharply.

Corn is grown year after year until production drops too low to pay for work and seed. Fields are then let lie fallow for a year or more before another crop is planted. Vegetables, squashes, peppers, and the like are grown on protected sites about the villages. This is a land of corn and pine—and volcanos.

The Paricutin volcano is a source of interest in several fields of knowledge. For the first time, scientists have been given a chance to follow the life history of a volcano from birth, so to speak. The volcano is still active according to last reports. While the explosive intensity has waned, new lava flows have taken place in the month of April.

At the time of our study of erosional phenomena in the summer of 1945, explosive activity had waned intermittently. For the first 3 days of our studies, activity was not great. But later the volcano put on a great show. We stayed in the "Caseta" (little house) of asbestos walls and roof, about 3 miles from the cone. Frequently at night great roars of blasts from the cone would awaken us to look upon a hellish display of "fire and brimstone." Great blasts of gases and streams of glow-



Los Reyes Valley produces bananas, coffee, mangoes, and sugar cane. But now the sugar crop fails, because of the damage to the irrigation system by floods from the Parícutin area.

ing volcanic bombs were shot high into the air. Bombs formed fiery arcs as they showered down some to fall back into the cone, others to roll down slope as fiery run-off. We seemed to be watching the making of a world. Here were unleashed forces of many kinds—physical, chemical, and electronic. Lightning flashes from time to time lighted up rolling turbulent columns of ash-laden vapors. The earth's surface quivered in its spasms, erupting tremendous jets of gases.

The venerable geologist of Mexico, Dr. Ezequiel Ordonez, has followed the eruption closely from the second day and has estimated that on the average the water vapor in gaseous clouds shot forth in the early stages of the eruption was equivalent to a flow of water of 1 cubic meter per second, or a stream of 35 cubic feet a second, of magmatic water. This is new water formed out of the molten rock that sees the light of day for the first time and is added to the sum total of the earth's store of surface waters.

Other gases made up a small part of the impressive column of cumulous-like clouds that moved away from the volcano. Whitish and bluish-white



Where ash is fertilized, the Tarascan Indians have grown corn. Other nearby fields are still bare.

clouds about the cone indicated gases of hydrochloric acid and of ammonium chloride. Sulphur fumes were scarcely noticeable from fumaroles about the cone.

We were interested primarily in the dynamics of the spectacular erosion that occurs in the covering of volcanic ash. Space here permits only a general description of "ash erosion" and some of its consequences locally and down in the Los Reyes Valley, about 25 miles away.

Nowhere had we seen all kinds of erosion so fantastically demonstrated as in the ash deposits about the volcano. Sheet erosion, rill erosion, gully erosion, steam capture, mass movement, mud flows, sapping, colluvial erosion, and wind erosion—all these forms in miniature and in large were found in hundreds and thousands of examples.

The hydrology of the area has been much changed by the deposit of ash. Volcanic ash is assumed to have a high infiltration capacity. Villagers reported that since the ash fell springs have burst forth in new places and old ones flow stronger. This would suggest that more water is percolating through the "ash mantle" than in pre-volcanic days. Yet it seems that either run-off has increased, or its erosive power.

Rill and gully erosion is far greater than in surrounding areas little or unaffected by the fall of ash. Gullies have been cut through the new ash layer, and down into the old soil sometimes to considerable depths, up to 25 feet.

No measurements are available to determine whether the run-off which caused this gulying is greater than before the eruption. New moisture added at the rate of 1 cubic meter per second would add very little to total rainfall of the region. Precipitation records at towns nearest the volcano show no significant changes in rainfall before and after the eruption. Such spectacular erosion, however, calls for an explanation.

Where the fresh ash layer is totally bare, as near the volcano and in open fields where all vestiges of crops have been covered, sloping surfaces were cut by erosion rills closely spaced. But in forests where leaf-fall had covered freshly fallen ash to form a new forest litter, little rilling was in progress following leaf-fall where the ground surface was covered. Storm runoff from litter covered surfaces no longer cut rills, but as it flowed across bare fields down slope picked up loads of ash and eroded down into underlying soil.

During a heavy rainstorm we noted how volcanic ash surfaces absorbed rain as it fell. After a time slumping of ash on lower slopes occurred, apparently caused by an accumulation of water in the ash faster than it was percolating to greater depths. These slumps behaved as small mud flows. Out of these slumps, water drained from the ash and started streamlets that coursed down slope to form rills. Head cutting of rills worked up slope near to the dividing ridge. On gentler slopes rilling was not noted nearer than 10 feet of the flattish ridge top, but on steeper slopes rills approached nearer the divide.

Once rills were cut they became drainage channels for surface waters as well as for escape of perched water tables in the mass of ash. Further erosion with stream capture enlarged some to form larger rills that in time became gullies. Run-off accumulated from drainages of several acres cut great gullies through the ash layer into former soil surfaces.

One thing that puzzled us was the way the water accumulated in the ash near the surface as perched water tables during a heavy rainstorm. This suggested that the rate of percolation to greater depths was less than rates of infiltration at the surface. In former farm fields where the ash covered a soil of fine texture, it could be assumed that rates of water intake by the underlying soil would be less and cause the formation of a perched water table. Yet these perched water tables occurred on hills and mounds of fresh ash. Layers of ash up to 20 feet deep about the volcano would also allow for the accumulation of more water than usually fell in one storm, which during our observations was not greater than 2 inches. Compaction of the ash by weight of overlying material may reduce percolation rates of water but this would not necessarily cause perched water tables. No, these fantastic patterns of rills and gullies on all sloping surfaces were brought about by other causes.

Much more information is needed on intensities of rainfall infiltration and percolation rates before we can state the causes with exactness. Yet our field observations suggest a probable reason for such acceleration of erosion. Reduced transpiration loss from the ash because of its barrenness of vegetation would let a greater quantity of water accumulate in the ash.

Absence of vegetation to exhaust the water-holding capacity of the ash mantle would in this way add to the amount of run-off from rains. Be-



Lava flows have crowded streams out of their channels, and storm floods skirt the flows, cutting into the ash. This flow contained more than 50 percent by weight of ash in suspension.



Ash about the volcano exhibits a fantastic array of erosional forms. Here, surfaces without benefit of vegetation are subjected to erosion in the raw.

low the layer of surface evaporation the mass of ash holds water at its maximum moisture-holding capacity. Any water added in a rain after replenishing evaporation losses from the surface 4 to 6 inches, as based on other studies, would percolate no more rapidly than the least permeable layer beneath. With differential percolation rates in the underlying layers, moderate rains might well cause overcharging of the ash with water and run-off through rills and gullies.

Fresh ash contained a strikingly large percentage of total clay in mechanical analyses—from 5.14 to 12.14 percent. This high content of clay was consistent in ash fall near the volcano as well as several miles distant. According to Stokes' Law, larger particles fall more rapidly than fine. Large ash particles fall out of turbulent vapor clouds more rapidly than very fine particles which may remain in suspension for long periods of time. Differential rates of fall, however, are interrupted by rains that bring down from time to time finely divided dust that otherwise would remain long in the atmosphere. Ash fall under these conditions forms layers of coarser material covered with thin layers of fine textured material that we suspect change in important degrees the rate of infiltration. Partial sealing of the ash surface by the layering of clay fractions may well increase run-off coefficients of heavy rain and within the mass of ash cause the building up of perched water tables. Both functions would cause rilling and greater surficial run-off and may well account for accelerated erosion of the ash.

Moreover, the ash lacks cohesive materials, and has single grain structure. Surface flows pick up capacity loads rapidly to cut rills and gullies. Also, streams armed with ash are abrasive agents to cut and carry material out of the ash layer and underlying soil.

In those areas where forest trees were not killed and dropped layers of needles on fresh ash, we found and studied instructive contrasts in erosion within such forest stands and in adjoining open fields. A slope draining into Narita Barranca was studied in detail. In the slope transect of 900 feet, gradients varied from 3 to 35 percent. It was steepest from the summit. The upper third of the slope was covered by a young forest of pine with 300 trees (d. b. h., 8 inches) to the acre. The trees had been little damaged by an ash fall of 8 to 9 inches. The ash layer under the forest had been heavily cut with erosion rills before the

fall of pine needles that formed a new layer of forest litter. Thereafter, little cutting took place in the forest stand.

Below the forest lay open fields that had been cultivated to corn before the volcanic eruption. The ash covering of the field was deeply cut by rills, many of which were cutting into the underlying soil. A transect across the slope showed 37 percent of the area was in rills. Erosion was still active on the upper slope, particularly just below the forest, where run-off from the new forest litter quickly picked up its load of ash and soil. Further down slope as the gradient flattened out, transporting power of run-off was lowered and deposition of ash took place.

Further away from the volcano where the thickness of ash was less than 6 inches, vegetation continued to grow in forest stands and to lay down ground litter that soon practically obliterated evidence of ash fall. But in bare fields erosion was active, unless slopes were nearly flat. Where forests had been damaged by heavy ash fall and leaf litter was covered by later ash falls, gullies had cut deep into the ash and underlying material and were still active.

We took every opportunity to observe and sample storm run-off and its burden of ash. On one such day west of Zirosto village we witnessed a large flood from a torrential rain falling back in the ash-covered mountains. The angry flood was steely black and flowed as a heavy liquid without foam. We watched and photographed a standing wave of 10 to 15 feet high. So powerful was this flood flow that banks quivered under impacts of the swirling current with suspended load of 64 to 65 percent by weight according to our samples, and with a density approaching 1.8 or nearly twice as heavy as water.

Such a flow had damaging effects in lower lying agricultural valleys. We made a 3 days' horse-back trip to Los Reyes to investigate effects of floods of ash laden waters draining the volcanic area.

Los Reyes lies in a beautiful valley at about 4,000 feet elevation ringed around by old volcanic cones and the escarpment of the plateau on the east. The climate is near-tropical. Bananas, coffee, mangoes, and citrus fruits are commonly grown. But it was to sugarcane and its sugar that the city of Los Reyes owed its prosperity until the volcanic eruption. One sugar mill was completely out and the other ran at much reduced capacity.



Forests suffered severely from volcanic bombs and ash. Branches were overloaded and broken off, vegetation smothered, gullies slashed.

Labor dependent on the sugar enterprise had to leave Los Reyes for want of work. A depression had settled down upon this picturesque town, where people talked most about the time when the irrigation of the valley would be restored.

Here are the events that led up to the depression :

Run-off in the Itzicuaró River, from storms of the 1943 and succeeding summer rainy seasons, was heavily charged with volcanic ash. At first, irrigation canals and ditches were choked with ash deposits. It was a costly and difficult task to keep them open. Next the diversion dam was washed out and irrigation waters were stopped. Several millions of dollars had already been lost as a result of floods out of the ash-covered mountains. Floods heavily charged with ash brought down great boulders and floated them out over good farm land in the valley. Thus far, the erosion occasioned by the volcano has done greater damage than the lava, heavy though that is. But the volcano is not yet extinct and its effects direct and indirect are still going on.

One of the least expected effects of the ash fall was the reduction in the fruit crop. Bees that pollinated flowering fruit trees were killed off in some way. Lacking these busy agents of pollination, the fruit crop has been short for the past 2 years.

But the ash when not too deep does little damage to the soil. In fact, villagers at Zirosto told us that

where they could plow through the ash-cover into the underlying soil their crops were greater. Their wheat yields were three-fold that before the eruption. The ash, when not deep, may serve as a mulch that increases rain intake and reduces surface evaporation.

Moreover, the ash is one of the best of soil materials. The lava and ash are derived from an olivine basalt of the volcano. This material contains a good store of the elements required in a fertile soil except nitrogen. As soon as the ash weathers enough to release fresh supplies of plant nutrients, it can be looked upon as a blessing. But until that time, accelerated rilling and gullying have caused and still are causing considerable damage.

The villagers of Zirosto would not leave their homes, even though the Government had offered to resettle them as were those of Parícutin and San Juan de Parangaricutiro. Ash fall about Zirosto measured about 12 inches in depth and had smothered and destroyed all pastures for their livestock. They butchered or sold their cattle and draft animals. The ash was too deep to plow with local wooden plows. Yet with these resources gone the villagers still stayed on, hoping to get the use of tractors and large plows to turn up some of the old soil for a seed bed. They had confidence that their crops would be better than before.

Volcanoes do not occur every day. Eruptions

change the shape of the landscape and spread their effect in ash falls over large areas. The Paricutin volcano and erosional phenomena in the mantle of ash spread over the country are doubtless similar to many occurrences of the past as is shown by the hundreds of extinct, forest-clad volcanic cones of the State of Michoacan, Mexico. The valley floors filled in with ash washed off steeper slopes of mountains and cones and finally formed fertile valleys as the fresh ash weathered. When principles of soil conservation and sound soil management are applied, these ash-derived soils are among the most fertile.

Erosion in the raw furnishes opportunities for studying phases of the dynamics of erosional processes that are operating at much slower rates in unaffected landscapes. Erosional phenomena in the mantle of volcanic ash spread by the Paricutin volcano disclose a full range of processes of land sculpture. Erosion and storm run-off are accelerated. Eroded ash is washed out in valleys between old volcanic cones to form alluvial fills so characteristic of this part of Mexico. Flood flows cut deep gullies through these valley fills and carry great amounts down stream to the coastal plain. After the eruption dies down and vegetation again reclothes the land surface, fertility will be released as this latest layer of ash weathers.

Prospects for control of this accelerated erosion in thick layers of volcanic ash depend upon whether eruptive activity of the volcano is renewed sufficiently to lay down heavy layers of ash again. If not, accelerated phases of erosion will vary with slopes of gradients until vegetation regains control of surfaces. Within forest stands still living, the annual fall of older pine needles is building up layers of new forest litter that is beginning to, and will, control erosion in the ash layer. But in former cornfields on sloping land, erosion control will depend on the rate of recovery of vegetation or a return to cropping according to principles of conservation farming. Many fields of steeper slopes are so badly cut up with gullies that efficient farming is excluded. Special treatment of such fields is necessary to save these lands from further damage. Fields with flat slopes, however, are generally areas of deposition rather than of erosion. Ash is spread out over these fields in remarkably uniform and even surfaces. Cropping in these cases calls for steps to restore a cover of vegetation of natural growth or crops.

A method of long-range control is also possible.

Storm run-off charged with heavy loads of ash in suspension is still cutting rapidly, lowering base levels in big gullies and in streams. Striking exceptions to this down-cutting were found in old lava flows that in some former volcanic eruption had flowed down former valleys and come to an end. These lava plugs serve to establish base levels of erosion for the drainage above such points. Cutting of lateral channels is controlled by these lava plugs and suggests the construction of permanent check dams at strategic localities to establish other base levels of cutting. Such structures would call into play the principles of physiographic engineering or torrent control as has been worked out in the Basses Alpes, France.

Measures for speeding up the spread of a ground cover of vegetation call for experimental studies in reseeding with suitable crop plants including legumes and in fertilizing the raw ash. Wherever underlying soil in old fields can be mixed with fresh ash by deep plowing, crops may be grown with prospects of good yields.

Favorable effects of the ash layer when not over 6 inches thick may be due to a number of influences. One of the most important is the mulch effect in the conservation of moisture and heat. Excellent opportunities exist throughout the ash covered area to carry on investigations on various effects of this remarkable ash layer.

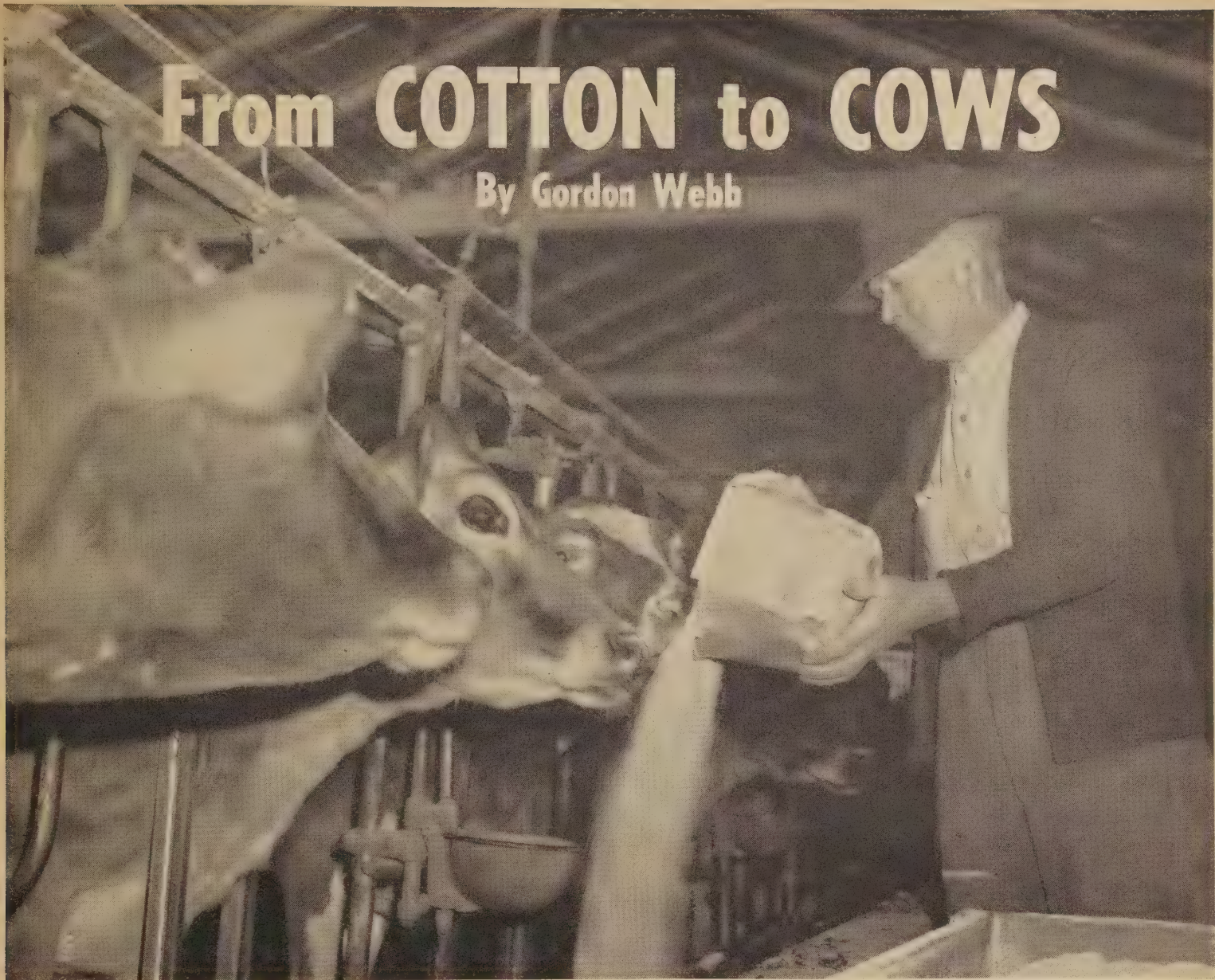
The fall of volcanic ash over this picturesque forest and farming country has had a damaging effect in smothering out crops and vegetation and in accelerating erosion from slopes where the ash fall was heavy. On the other hand, the ash, being excellent soil material, will in time make lands more productive of crops. By applying principles and measures of physiographic engineering and conservation farming, damaging effects of the ash may soon be brought under control, provided, of course, no further violent eruptive activity of the volcano takes place.

Lava flows in their formidable jagged black mass are an entirely different story, for it will take a geologic age for the lava to weather. Land covered by the lava flows is put out of any use for a long, long time.

That one idea, found in the pages of *Soil Conservation Magazine*, may be worth a lot to that neighbor of yours. He, or you, may subscribe by sending \$1 to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

From COTTON to COWS

By Gordon Webb



The cows are eager for this ground feed, largely home-grown on land terraced, contour-tilled, and under good crop rotation.

THE SOUTH has lost thousands of young men and women because they believed there were greater opportunities elsewhere. But W. D. Finch, Sr., has kept three of his four sons with him on his 170-acre farm near Pauline, S. C., by changing from cotton to dairy farming and by following a soil conservation plan that puts all his land to its best use. The other son had moved North before the decision was made.

During the war, the elder Finch and W. D., Jr., ran the dairy business while M. C. and John served in the Army. The boys are back now,

NOTE.—The author is head, current information section, Soil Conservation Service, Spartanburg, S. C.

and the father-son combination is clicking. The dairy makes a good living for all.

The change from cotton to livestock came about through hard work, good cattle, and soil conservation. Registered Jersey calves entered the picture when Ernest Carnes was county agent of Spartanburg County, and two of the boys were 4-H Club members. Soil conservation took hold in 1938 when J. H. Talbert, Soil Conservation Service, helped the Finches to plan and get under way a complete program for erosion control, soil building, water conservation, and good land use. This work is being continued in cooperation with the Broad River Soil Conservation District.



As for hard work—well, the Finches have always worked that way. But with cotton, they always seemed to be in debt. The oldest son, E. E. Finch, already had left the farm for a job in Toledo, Ohio, before dairying was started.

Talbert first told us about the Finches. We went to the farm to make a picture of the cattle grazing kudzu. It was just before frost, and the permanent pastures had played out. We found 30 cows grazing on 5 acres of kudzu where once had been some of the poorest land on the farm.

A few days later we stopped W. D. Finch, Jr., while he was delivering grade A milk to customers in Spartanburg.

He told us the change in farming didn't happen overnight. The Finches "grew" into the dairy business, with the 4-H Club animals as foundation stock. Fifteen of the thirty cows are registered Jerseys. The rest are good grade Guernseys and Holsteins. A registered Jersey bull leads the herd.

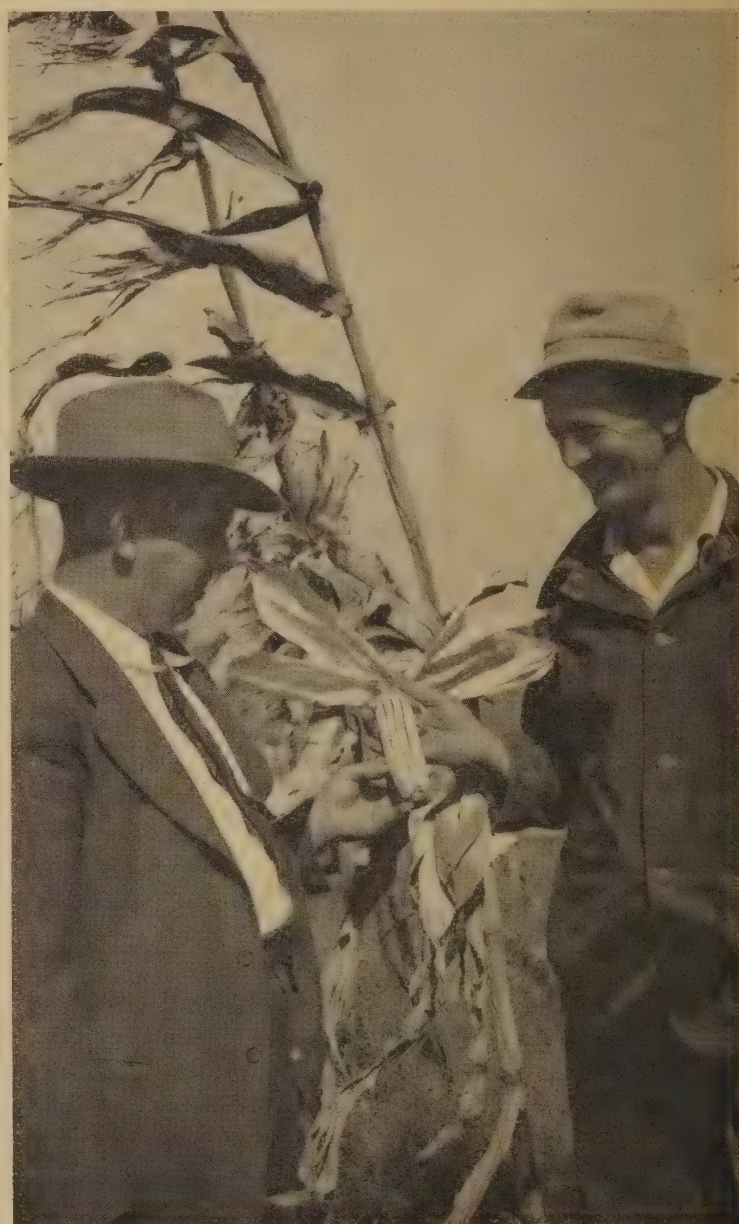
Cotton last was planted on this farm in 1940. That was the year the Finches started selling bottled milk. Since that time the cotton house has been used to store grain and hay.

You might say that the Finches have established a dairy business on 110 acres, for 60 of the 170 acres are in woods. On this open land they grow all the roughage—hay, silage, and grazing—required by their cattle and about one-third of the grain ration—oats, barley, and corn. The Finches find that the close-growing crops and pastures are much easier on the land than cotton.

Crimson clover is a key crop in the livestock program, and W. D., Jr., said he remembers that the Soil Conservation Service gave him the first

(Continued on page 293)

Kudzu has made valuable some of the land on the Finch farm—land that was once the poorest.



This hybrid corn, tried last year, looks good to John Finch (right) and J. H. Talbert.



Madrid Sweet Clover—a promising newcomer

By Joe C. Tinney

Checking up on their potential seed yield of yellow annual sweet clover. Mr. and Mrs. J. M. Gill are cooperators in the Central Colorado Soil Conservation District.

MADRID sweet clover has become increasingly popular during the past 3 years among farm and ranch cooperators of the Central Colorado Soil Conservation District in the Coleman, Tex., vicinity. It has proved excellent for conservation and improvement of the soil, and serves well as a cash crop and temporary pasture plant. Before the advent of this legume none had been used in this district.

The Madrid variety of sweet clover is a biennial, yellow-blossom type comparatively new to the Western Gulf region of the Soil Conservation Service. It is leafier, finer stemmed, and has more vigor when young than some of the more common varieties of sweet clover. Current indications are that it contains very little coumarin, an element detrimental to livestock, that is found in some sweet clover.

NOTE.—The author is work unit conservationist with the Soil Conservation Service, Fort Worth, Tex.

Farmers who have knowledge of the productivity of their land over a long period of years report that maximum oat yields have declined from 80 or 100 bushels per acre to 50 or 60 bushels. Cotton lint yields have fallen from half a bale to one-fourth or one-third bale per acre.

Ulmer Brannan, a cooperator in the Buffalo conservation group near Santa Anna, has owned and operated the same land more than 40 years. He says, "My crop yields are only half as large as they were 25 years ago. Although the land has been terraced and planted on the contour for the past 10 years, yield increases have been slight because these practices alone cannot increase soil fertility. The land needs soil improving crops, such as sweet clover, to build it back."

Madrid sweet clover is palatable to livestock. One Coleman farmer reports that his sheep grazed it to the ground before starting on Sudan grass in the same field.

Stock farmers are finding the carrying capacity of Madrid sweet clover superior to that of any other temporary pasture crop they can grow in the Coleman area. It provides from two to four



times more grazing for livestock than does common Sudan grass. Raymond McElrath, soil conservation district cooperator at Coleman, says that his Madrid sweet clover provided adequate pasture for 63 days during the summer of 1944 for an average of 19 sheep per acre. Again in the fall, 38 sheep per acre were grazed for 3 weeks, making a total of 14 animal months of grazing per acre for the year.

Another cooperator, W. F. Barnes, of Santa Anna, last summer grazed 200 ewes and their lambs on 20 acres of Madrid sweet clover from June through August. That amounts to 10 animal months of grazing per acre. William F. Deal, Gouldbusk conservation farmer, pastured the equivalent of 12 cows and 85 ewes for 5 weeks on a 6-acre field on his place. Grazing for 400 sheep for a week and for 40 cows for 2 weeks on 8 acres is the record of Harold Wheat, another district cooperator at Gouldbusk. He left stubble standing from 8 to 12 inches high when he took his stock off the 8 acres.

With proper stocking, it is thought that the grazing period for Madrid sweet clover may be extended from May 15 through December. Such a grazing period would fill a strongly felt need for an adequate forage plant of high nutritious quality to meet the grazing requirements of livestock while permanent pastures are getting needed rest. The crop usually is planted in February and March and is ready to graze by May 15. Growth continues until January when hard freezes usually cause the plant to become dormant. Local grow-

Ewes and lambs on 7-acre field of yellow annual sweet clover, Raymond McElrath farm, near Coleman. McElrath ran 20 ewes and 60 December lambs on the clover two weeks. He says he'll have to increase stocking rate to prevent clover from becoming rank.

ers around Coleman recommend that sufficient acreage be planted each year to satisfy the grazing needs of the farm and that the second-year growth be used only for soil improvement and seed production.

The income of Central Colorado Soil Conservation District cooperators has increased by growing Madrid sweet clover for pasture and soil improvement. Income from sale of seed alone is equal to, or greater than, the proceeds from the usual cash crops. The Madrid seed is harvested with a combine. The crop residue is left on the ground to help improve productivity and soil structure and to help control erosion.

Andy Broyles, a supervisor of the soil conservation district who lives near Talpa, harvested 10 acres of seed last year. He made \$40 an acre from the harvest, although he estimates that harvesting difficulties forced him to lose at least half of the seed produced.

The cost of growing Madrid sweet clover is low. Only 3 to 5 pounds of seed are planted to the acre. Current prices run from 25 to 32 cents per pound. In planting, regular 36- to 42-inch rows are satisfactory. A smooth, firm seed bed is essential. A row-planter, with the covering plows and opening sweeps removed and equipped with plates having five holes of three-sixteenth-inch diameters, has

been successful in seeding at the desired rate. A chain or light sandbag dragged behind the planter covers the seed to about one-half-inch depth. A tight seedbox prevents unnecessary loss.

Cooperator Jim Gill of Whon reports soil structure, fertility, and productivity greatly improved after he had used the clover three consecutive years on one 3-acre plot. A check plot which had never grown a soil-improving crop was laid off with the clover plot. The check was to be plowed and seeded to oats, but Gill found the ground there too hard to plow. His clover land was mellow and turned easily.

Trial plantings of annual yellow-blossom, common biennial yellow-blossom, Hubam and Madrid sweet clover have been made by cooperators of the Central Colorado District during the past 3 years. They have found the Madrid variety outstanding.

Demand for seed increased from less than 300 pounds in 1943 to more than 3,000 pounds in 1944 and over 6,000 pounds in 1945. For 1946 the figure is above 10,000 pounds. Before the trial plantings, sweet clover was not believed adapted to this section.

B. B. Fowler, chairman of the board of supervisors for the Central Colorado District says, "Madrid sweet clover is definitely here to stay. It's a crop we need, one we can use handily, and one which pays us handsomely."

Farmers expressed their approval of the plant last summer when they met with the district supervisors of the soil conservation district at Coleman and organized the Central West Texas Madrid Sweet Clover Improvement Association. The organization's purpose is to promote a readily available source of pure seed. Madrid sweet clover is recommended for north Texas and for Oklahoma by the experiment stations of these states.

FROM COTTON TO COWS

(Continued from page 291)

seed he planted on an observational plot. Talbert inoculated the seed and helped him to plant it. That was in 1938.

"We have 25 to 27 acres of crimson clover every year," W. D., Jr., said, and then he told us where most of it was grown last year. "All the back field, about 8 acres above our permanent pasture, was in clover and rye grass. The east field, next to the Allen farm, was in clover for spring grazing; about

6 or 7 acres there. We had about 3 acres in the field where you saw the cotton house full of hay and grain. Then there were 4 or 5 acres of clover and oats across the road from the mail box where the road turns to Mr. Gregory's. We turned that under and planted silage corn—and did it make corn! This land had a heavy application of fertilizer and manure."

In addition to its use for grazing and soil improvement, crimson clover planted with oats and barley produces a part of the hay crop on the farm.

The Finches have 15 acres of what W. D., Jr., called "a really improved pasture."

"In the spring of 1945 we fertilized and limed our improved pasture, and it really paid," he declared. "We used the manure spreader to put out 3 tons of lime per acre. Then we spread 600 pounds of 18 percent phosphate fertilizer and 700 pounds of basic slag per acre."

This pasture contains lespedeza, Dallis grass, Bermuda grass, and yellow hop clover. "And we're trying to get white clover started," W. D., Jr. added.

Cotton and corn formerly grew where this pasture has been made, and the Finches are planning to put the rest of the field—the 8 acres which grew crimson clover and rye grass in 1945—into permanent pasture. They hope to get a start of an improved Bermuda grass in this new pasture.

Then we asked the young dairy farmer about the 5 acres of kudzu.

"We'd have been without grazing if we hadn't had that kudzu," he said. "We kept the cows on the kudzu until about 11 o'clock each morning, and it helped to keep up milk production."

Finch said that the kudzu provided grazing for the 30 cows for 3 weeks, and that its worth was around \$25 an acre. He arrived at this estimate by calculating how much hay he would have had to feed if it weren't for the kudzu.

The original planting of kudzu covered only 3 acres. Since 1938 the vines have been permitted to spread to two additional acres. "We're going to let it keep on spreading," the elder Finch told us.

Soil conservation and dairy farming have been good for both the Finches and the land. As W. D., Jr. expressed it, "We've paid off all our debts since 1938, and the land is a lot better."

During and since the war, demand and price for milk have been good. So far as the future is concerned, John Finch spoke for the family when he said, "If you produce better milk you can sell it."

REVIEWS

PAY DIRT. Farming and Gardening With Composts. By J. I. Rodale. \$3. New York. Devin-Adair Company. 242 pp.

"Pay Dirt" is undeniably a controversial book; therefore, it is good reading and likely to do a great deal of good. The book already has started considerable discussion—some of it pretty heated—in the short time since it was published.

Two important—and highly articulate—groups undoubtedly will dislike "Pay Dirt:" the fertilizer manufacturers, who will have no difficulty whatever in discovering that Rodale has no use for their product; and the soils scientists, who, humanly enough, will not like to have their comfortably fixed ideas about soil management and productivity upset.

Actually, there are few statements in the book which you can put the finger on as wrong, except by inference, but while you cannot agree with everything the author says, neither can you wholly disagree.

For instance: No soil conservationist in his right mind would dream of arguing against Rodale's first premise, that soil with a lot of organic matter in it is better than soil with little or no organic matter. The need for high humus content in soil is accepted generally. Its advantages are many and they are common knowledge. Most soil conservationists, on the other hand, certainly would dispute the inference that ample organic content would so control erosion as to make physical and agronomic measures unnecessary. That is one of several places in his book where one is inclined to think that the author has let his earnest enthusiasm lead him into sticking his neck out too far. This, of course, is not a peculiarity of this author; remember "Plowman's Folly"? And it is this sort of rash zeal which makes people call Rodale a "cultist," to which he objects so strongly.

In spite of sounding pretty much like a patent-medicine testimonial in spots, "Pay Dirt," is a challenge not only to all gardeners and farmers, but to agricultural scientists, particularly those engaged in research to improve our agriculture

and benefit our people. Not enough has been done in this field to enable anyone to say finally and specifically that the author is right or wrong. This was indicated, I think, by Constantin C. Nikiforoff, who wrote in "Soils and Men" (USDA Yearbook for 1938): "Humus serves a number of functions, *all of which are not fully understood at present.*" It seems that this is still true, 8 years afterward.

—William C. Pryor

ICELAND FORESTER REPORTS

Hakon Bjarnason, of the State Forestry Service of Iceland, who visited *Soil Conservation Magazine* last summer, writes from Reykjavik:

"I stayed in Alaska for 7 weeks and visited Juneau, Sitka, Cordova, Seward, Anchorage, Palmer, and Fairbanks but I spent most of my time in College Fjord, Prince William Sound, and on the Kenai Peninsula gathering seeds. I was able to get some 200 pounds of Sitka spruce seed, and a little of mountain hemlock, white spruce, and some other species.

"I enjoyed my trip very much and I have nowhere met so much friendliness as there. The country is fascinating, with tremendous resources.

"I am sure you would have found it interesting to see the Matanuska farms but I could not help thinking that there have been too many mistakes in colonizing the valley. That project should have been better prepared and organized. . . . I am afraid that you may before long get some disheartening news of soil erosion from different places in the Matanuska Valley. I came to one place where some wind erosion has started recently, and I am sure that if it is not stopped very soon it may cost a lot of money later.

"What I found most interesting in the Matanuska Valley and on the Kenai Peninsula was that there is the same kind of soil that we have all over Iceland, a soil which is very liable to wind erosion.

"On my return from Alaska I took a trip through Oregon and California, saw some tree nurseries and many other interesting things, before I returned to the east coast and back home."

STATUS OF DISTRICTS

Latest official figures show that 1,516 soil conservation districts have been established under 45 State soil conservation districts laws.

REFERENCE LIST



Compiled by William L. Robey, Printing & Distribution Unit

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¹From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

STUMPS IN THE WAY OF FOOD PRODUCTION



National Farm Safety Week

July
21-27

WHEREAS an increased supply of food is vitally needed to promote peace and happiness in the postwar world; and

WHEREAS farm accidents rob the nation of thousands of lives and millions of dollars worth of food and other property each year; and

WHEREAS experience in previous observances of National Farm Safety Week has clearly shown the necessity and benefits of a coordinated and constant educational farm-safety program;

NOW, THEREFORE, I, HARRY S. TRUMAN, President of the United States of America, do hereby call upon the Nation to observe the week commencing July 21, 1946, as National Farm Safety Week.

And I request all persons and organizations concerned with agriculture and farm life to do everything in their power to discover and publish the facts about farm accidents, and to develop practical safety programs which farm people everywhere can translate into direct action against hazards which daily threaten their lives and happiness. As a start, I specifically suggest that the farm people of the country observe National Farm Safety Week by resolving to eliminate at least one hazard a day until their farms are as safe as they can possibly make them.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States of America to be affixed.

DONE at the City of Washington this twenty-seventh day of April, in the year of our Lord nineteen hundred and forty-six, and of the Independence of the United States of America the one hundred and seventieth.

HARRY S. TRUMAN.

By the President:

DEAN ACHESON,
Acting Secretary of State.

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